Appear TV

Product User Manual

DC100x/110x

SC200x/210x

MC300x/310x

XC5000/XC5100

© Appear TV AS
PO Box 8 Lilleaker
NO-0216 Oslo
Norway

Tel: +47 24 11 90 20
Fax: +47 24 11 90 21
Email: support@appeartv.com
appeartv.com

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1 Introduction

Thank you for purchasing our products. Our high-quality product range is aimed at the professional segment of the video distribution market.

This manual describes how to install, configure, and operate your new equipment. It is written for professional operators of video distribution systems and assumes a prerequisite level of technical knowledge.

2 Installation and Safety

2.1 Installation and Safety (English Text)

The unit is designed to offer operators reliability and flexibility. It consists of a chassis in which a number of modules can be installed. To cater to specific system requirements, the chassis can be configured to host functional modules best suited for a given scenario.

Appear TV products can be delivered in different chassis variations - 1RU chassis and a 4RU chassis. The product models **DC1000/1001, SC2000/2001, MC3000/3001** and **XC5000** represents the 4RU chassis, while the product models **DC1100/1101, SC2100/2101, MC3100/3101** and **XC5100** represents 1RU chassis.

2.1.1 The 4RU Chassis

The 4RU chassis consists of a total of 18 slots all of which can host functional modules. Slot number 0 is dedicated to host the switch module and slot number 17 can only host multi-slot input modules. Alternatively a second switch module can be placed in slot 17 for some redundancy configurations. The remaining 16 slots are identical and can be occupied by any of the functional modules available. A 4RU chassis including a mandatory switch module, power supply connectors, and module slots is shown in *Figure 2.1 and 2.2*. Power modules and fan modules are inserted from the back (figure 2.3 showing the XC5000).

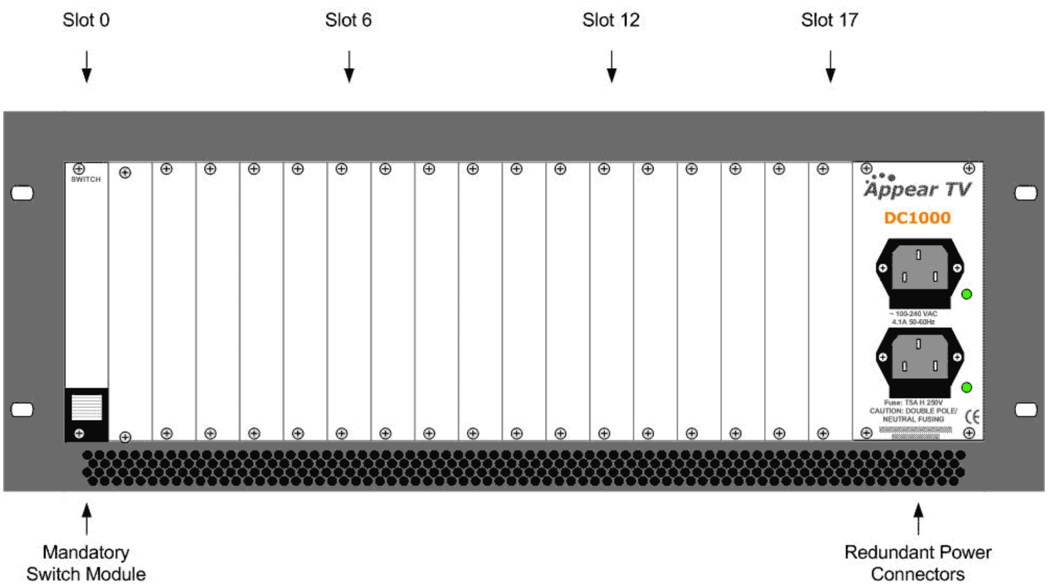


Figure 2.1 – 4RU chassis (DC1000/1001, SC2000/2001 and MC3000/3001) with power connectors, switch module and available slots.

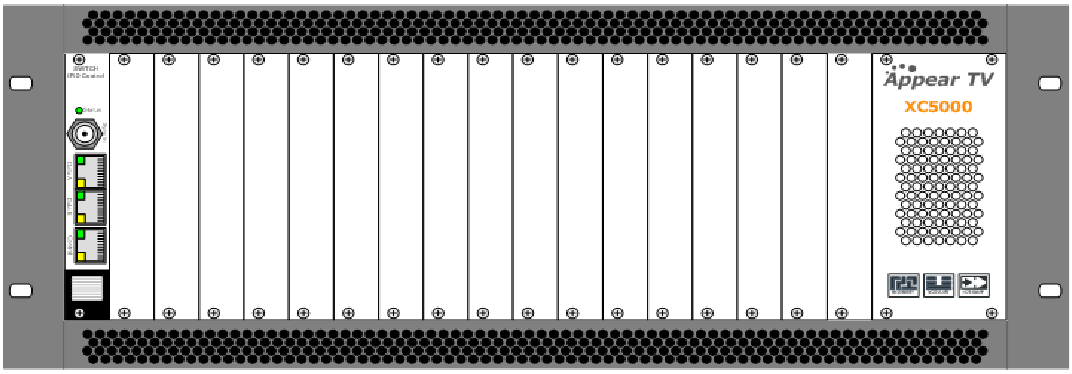


Figure 2.2 – 4RU chassis (XC5000) with front view

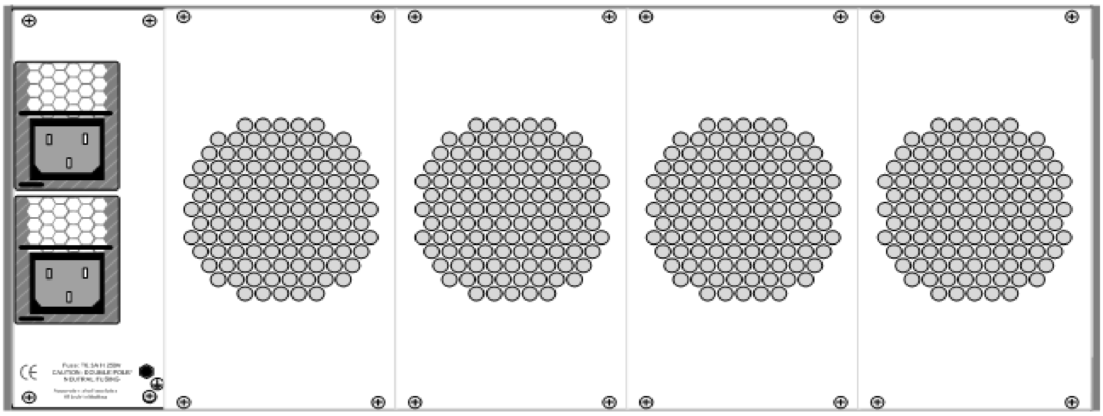


Figure 2.3 – 4RU chassis (XC5000) with rear view

2.1.1.1 Product models

4RU chassis models: DC1000. DC1001, SC2000, SC2001, MC3000, MC3001 and XC5000

2.1.1.2 Ventilation

The 4RU chassis with Telco mounting has forced air flow from front to back in the chassis, allowing for multiple units to be stacked above each other with no space in between. However, adequate space must be provided in front of and behind the unit for effective ventilation. For Broadcast mounting, air flow will be from back to front.

2.1.1.3 Replacing the power supply module

The 4RU chassis can be installed with one or two power supply modules (XC5000 always comes with two power supply modules). The modules can be exchanged from the rear of the unit. The chassis delivered with a single power module can be updated by acquiring additional power module.

If power is lost in one of the Power supplies, the other can feed the entire chassis. It is recommended to connect each input power at different circuits.

2.1.2 1RU Chassis XC5100

The 1RU chassis for the XC5100 holds of a total of 6 slot positions plus a slot for the Switch/IP module. The Switch/IP module is inserted in the front of the chassis, while the modules for the other 6 positions are inserted in the back of the chassis. All modules are hot-swappable, including power supplies and the fan module in front.

The 1RU chassis is equipped with dual 400W AC or 500W DC power supplies

Figure 2.5 shows the front and rear view of the 1RU chassis including a mandatory switch module, power supply connectors, and module slots.

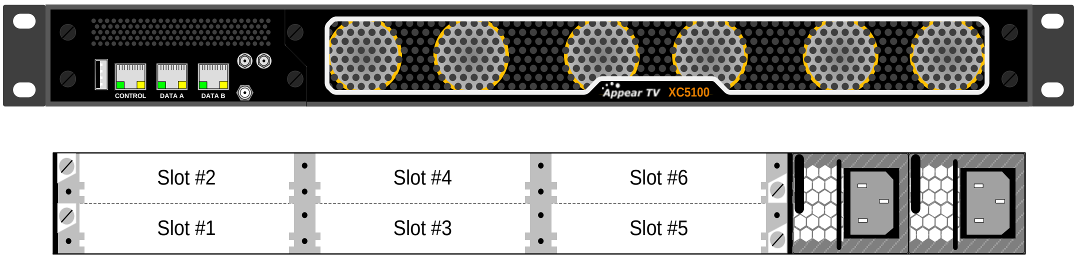


Figure 2.5 - 1RU chassis for XC5100 with dual power, switch module and available slots; front and rear view.

This chassis can hold 2 power supply modules for redundancy purpose

2.1.2.1 Ventilation

This XC5100 has forced air flow from front to back allowing for multiple units to be stacked above each other with no space in between. However, adequate space must be provided in front of and behind the unit for effective ventilation.

The XC5100 has 6 fans in front. Fan speed is temperature controlled. If one fan fails, remaining fans will increase speed to compensate. The whole Fan module, containing all 6 fans, can be hot swapped. If, during fan module replacement, the temperature on the inserted modules exceeds a certain critical temperature, the unit will shut down, to prevent damage of the inserted modules.

2.1.2.2 Replacing the power supply module

This 1RU chassis can be installed with one or two hot swappable power supply modules. The modules can be exchanged from the rear of the unit. The chassis delivered with a single power module can be updated by acquiring additional power module.

If power is lost in one of the Power supplies, the other can feed the entire chassis. It is recommended to connect each input power at different circuits.

2.1.3 Safety Considerations

The unit **must** be connected to a grounded power connection. The power input connector) is a **disconnect device**. To remove the power from the device, the power cables needs to be physically removed from the power input connector.

	Mandatory Safety Instructions
1	The equipment must be installed by a qualified person.

2	For that equipment with grounding, connect the driver before connecting the power cord. So opposite the power cord must be removed before removing the driver of the ground.
3	The equipment must be installed in a restricted area where: • Only qualified technicians have access or who know the most important safety measures. • Access to the area where the devices are installed will be using a tool, lock and key, or any other safety device, and in addition the site will be controlled by an authorized person.
警告：接続ケーブルのプラグは、切断するためのものです。 電源プラグが常に手の届きやすい場所にくるように設置してください。	

2.1.4 Installation

2.1.4.1 Power supply rating

The 4RU chassis is supplied with either a 100-240V AC 50/60 Hz power or -48V DC power. The 100-240V AC 50/60 Hz power supply is rated for maximum 300W, 400W or 800W[1]. The -48V DC power is rated for maximum 400W or 800W[2]. Figures 2.6. 2.7, 2.8, 2.9, 2.10, 2.11 and 2.12 below shows the power supply inlets.

The 1RU chassis is supplied with a 100-240V AC 50/60 Hz power rated for maximum 200W for product models DC1100/1101, SC2100/101 and MC3100 /3101.

The 1Ru chassis, product model XC5100, is supplied with single or dual 100-240V AC, 47-63Hz , 400W power, or with single or dual -48V DC, 500W power.

2.1.4.2 4RU chassis with 300 and 400W AC Power

The chassis can be hold two power supplies for redundancy and has independent power inlets for the two supplies.

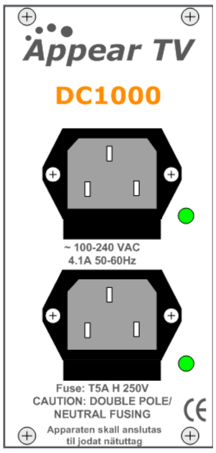


Figure 2.6 - Power Input for 4RU chassis with 300 and 400 Watt AC power

1 Contact Appear TV for more information.

2.1.4.3 4RU chassis with 800W AC Power

The chassis has two power supplies for redundancy with independent power inlets The power supplies and power inlets are located at the back of the chassis.

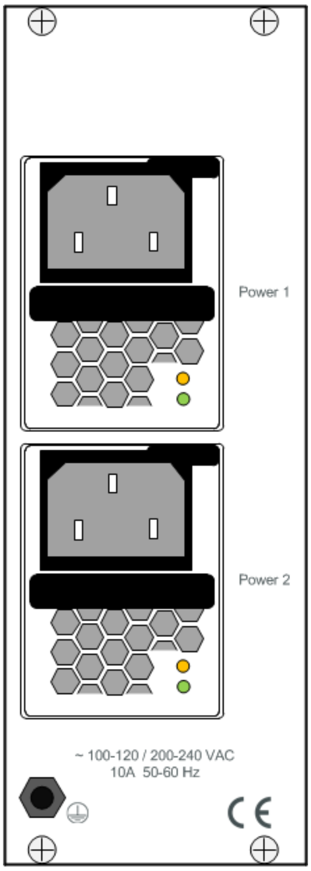


Figure 2.7- Power input for 4RU chassis with 800WAC power supplies

2.1.4.4 4RU chassis with 400W DC (-48Volt) Power supply

The chassis can be hold two power supplier for redundancy and has independent power inlets for the two supplies.

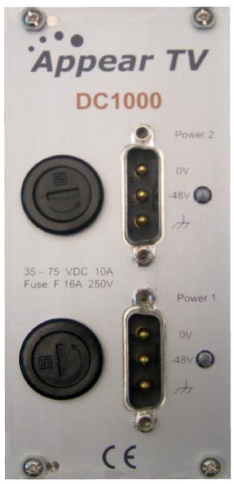


Figure 2.8– Front plate of dual 48V Power Supply in a DC1000

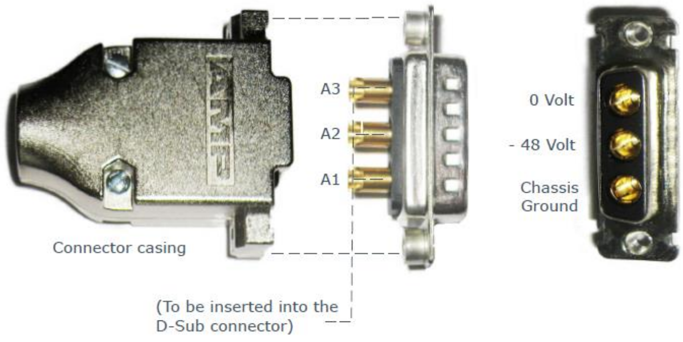


Figure 2.9 - Layout of 48V DC Power Supply Connector

2.1.4.5 4RU chassis with 800W DC Power

The chassis has two independent -48V DC power supplies for redundancy. The power supplies and power inlets screw terminals are located at the back of the chassis.

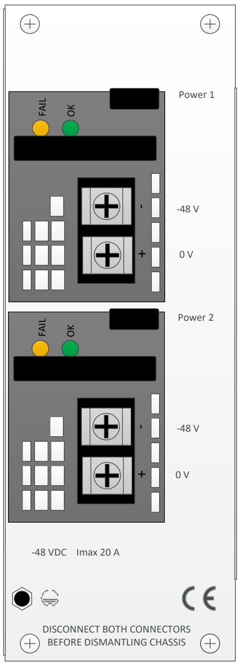


Figure 2.10- Power input for 4RU chassis with 800W DC power supplies

2.1.4.6 1RU chassis Product model XC5100 with AC power

The power input connectors are located at the back of the unit.

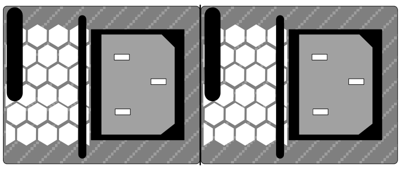


Figure 2.11 Power Input Connector for 1RU Chassis, product models XC5100 with AC power

2.1.4.7 1RU chassis Product model XC5100 with DC power

The power input connectors are located at the back of the unit.

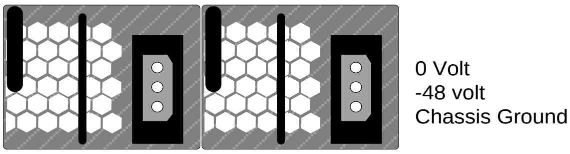


Figure 2.12 Power Input Connector for 1RU Chassis, product models XC5100 with DC power

2.1.5 Information on Disposal

This product must not be disposed of with other household waste. According to the WEEE-directive, everyone that sells electrical and electronic products shall ensure that the same products are disposed of in an environmentally sound manner.

Appear TV is a member of Elretur AS, a Norwegian nationwide take-back company for the collection, recycling and environmentally sound processing of scrapped electrical and electronic equipment. In accordance with local requirements you may return this product to:

Appear TV AS,
Lilleakerveien 2b,
0283 Oslo, Norway

We will free of charge accept your waste equipment for recycling. You may also choose to return this product to a collection point for the recycling of waste electrical and electronic equipment in your municipality.

If this product is purchased outside Norway, you may contact your local reseller to enquire about local collection points for recycling of this product, as applicable

2.1.6 Laser Safety

The Optical SFP modules used in the DC1000/1001/1100/1101, SC2000/2001/2100/2101, MC3000/3001/3100/310, XC5000 and XC5100products are classified as class 1 laser products according to IEC 60825-1 and are classified as class 1 laser products per CDRH, 21 CFR 1040 Laser Safety requirements.

Depending on the products configuration, the DC1000/1001/1100/1101, SC2000/2001/2100/2101, MC3000/3001/3100/310, XC5000 and XC5100 products can be equipped with multiple insertion modules containing housing for optical SFPs.

When installing SFP modules, please ensure that the module be placed in the housing present at the front of the IP input/output module. Once inserted, the SFP module will become active.

2.1.6.1 FDA/CDRH Compliant SFP modules

The below list of Optical SFP modules have been selected with regards to the FDA/CDRH laser safety requirements as the only optical modules allowed used with the Appear TV products in the USA, and any other countries and states that require compliance according to FDA/CDRH laser safety regulations.

Manufacturer	Model	wave length [nm]	Max output power (1)
Finisar	FTLF8519P2xCL	850 nm	-3 dBm
Finisar	FTLF8519P2xNL	850 nm	-3 dBm
Finisar	FTLF8519P2xTL	850 nm	-2.5 dBm
Finisar	FTLF1318P2xCL	1310 nm	-3 dBm
Finisar	FTLF1318P2xTL	1310 nm	-3 dBm
Finisar	FTLF1419P1xCL	1310 nm	5 dBm
Finisar	FTLF1518P1BTL	1550 nm	5 dBm
Finisar	FTLF1519P1xCL	1550 nm	5 dBm
Finisar	FTLF1519P1xNL	1550 nm	5 dBm
Finisar	FTLF1619P1xCL	1550 nm	5 dBm
Finisar	FWLF15217Dxx	1471, 1491, 1511, 1531 1551, 1571, 1591, 1611	5 dBm
Finisar	FWDM16197Dxx	1471, 1491, 1511, 1531 1551, 1571, 1591, 1611	5 dBm
Avago Technologies	AFBR-5710Z	850 nm	-3 dBm
Avago Technologies	AFBR-5715Z	850 nm	-3 dBm
Avago Technologies	AFCT-5710Z	1310 nm	-3 dBm
Avago Technologies	AFCT-5715Z	1310 nm	-3 dBm
OCP	TRXAG1SX	850 nm	-4 dBm
OCP	TRPEG1KVX-E1G	1550 nm	5 dBm
(1) Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations			

2.1.6.2 Warning: Radiation

Caution – use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

2.1.6.3 Labels

The following illustrations show the labels attached to the Appear TV products, according to the standards.

A classification label is attached to the top cover of the DC1000/1001/1100/1101, SC2000/2001/2100/2101, MC3000/3001/3100/310, XC5000 and XC5100 products.

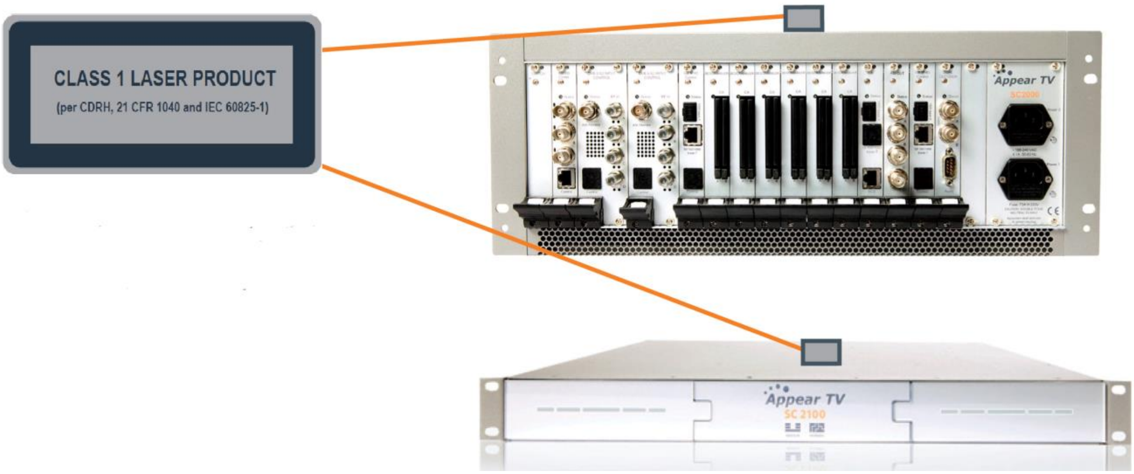


Figure 2.13 - classification label

A CDRH identification label according to 21 CFR 1010.3 is attached on the side of the **DC1000/1001/1100/1101, SC2000/2001/2100/2101, MC3000/3001/3100/3101, XC 5000 and XC5100** products.

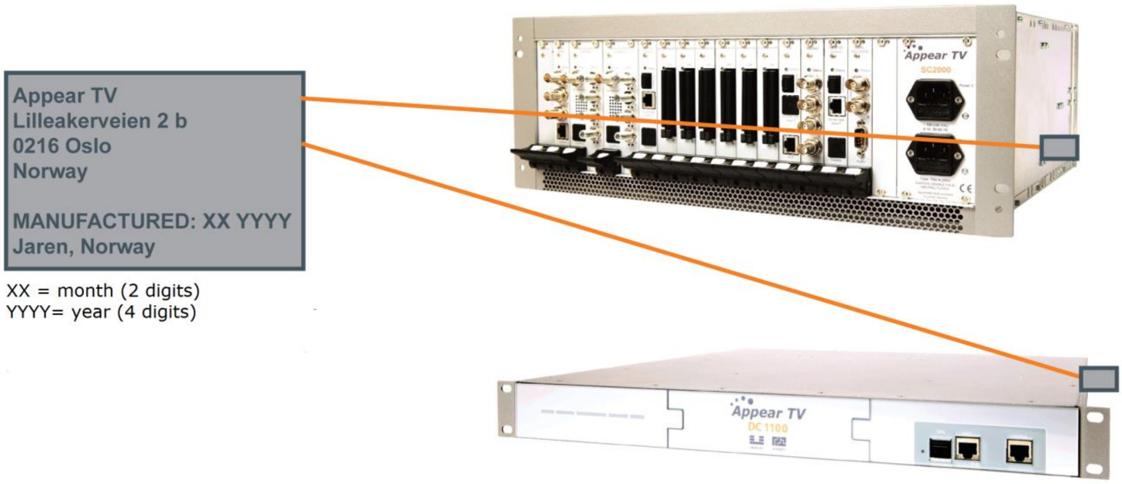


Figure 2.14 - CDRH identification label

2.2 Instalación y Seguridad (Spanish Text)

La unidad está diseñada para ofrecer a los operadores confiabilidad y flexibilidad. Consiste en un chasis en el cual un determinado número de módulos pueden ser instalados. Para atender las necesidades específicas del sistema, el chasis puede ser configurado para alojar los módulos más adecuados para un escenario determinado.

Los productos de AppearTV están disponibles en diferentes modelos de chasis: Chasis 1RU y Chasis 4RU. Los modelos DC100/1001, SC2000/2001, MC3000/3001 y XC5000 representan al chasis 4RU, mientras que los modelos DC1100/1101, SC2100/2101, MC3100/3101 y XC5100 representan al chasis 1RU.

2.2.1 Chasis 4RU

El chasis 4RU consta de un total de 18 ranuras, las cuales pueden alojar módulos funcionales. La ranura número 0 (cero) está diseñada para acoger al módulo switch y la ranura número 17 solo acepta módulos de entrada multi-ranura. Alternativamente, un segundo módulo switch puede colocarse en la ranura número 17 para algunas configuraciones de redundancia. Las 16 ranuras restantes son idénticas y pueden estar ocupadas por cualquiera de los módulos funcionales disponibles. En la figura 2.15 se puede apreciar el chasis 4RU incluyendo el módulo switch obligatorio, los conectores de alimentación y las ranuras de módulo. Los módulos de alimentación y ventilación son insertados en la parte posterior.

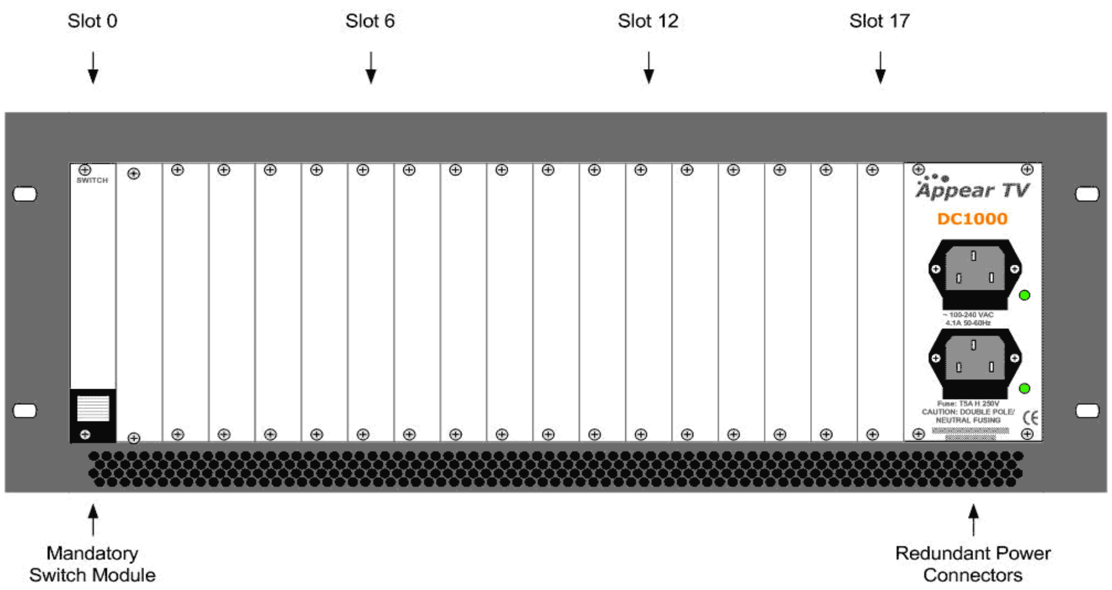


Figura 2.15– Chasis 4RU (DC1000/1001, SC2000/2001 and MC3000/3001) con conectores de alimentación, módulo switch y ranuras disponibles.

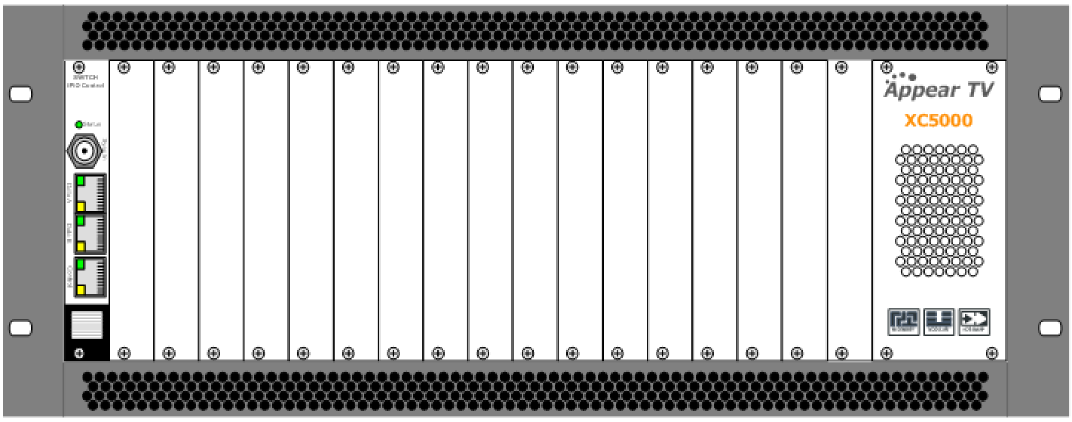
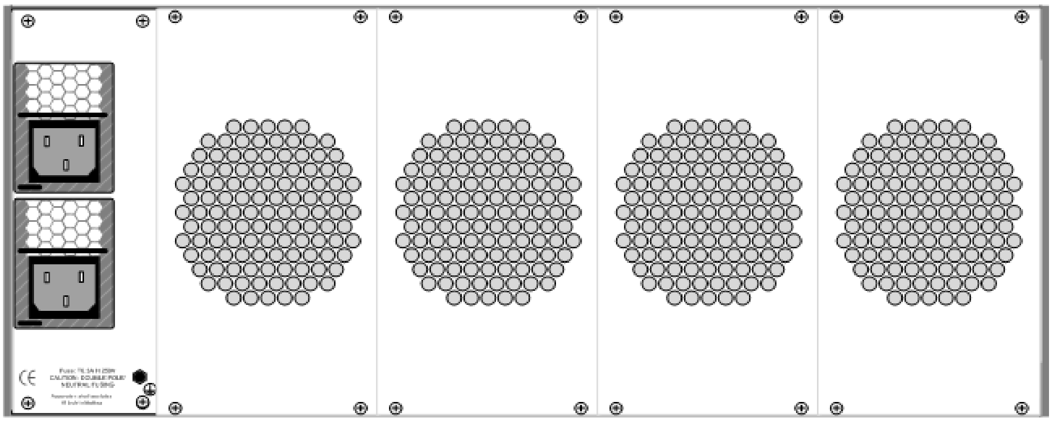


Figura 2.16 – Vista frontal del Chasis 4RU (XC5000)

Figura



2.17 – Vista trasera del Chasis 4RU (XC5000)

2.2.1.1 Modelos de Productos

Modelos de chasis 4RU: **DC1000, DC1001, SC2000, SC2001, MC3000, MC3001 y XC5000**

2.2.1.2 Ventilación

Para el chasis 4RU con montaje Telco, el flujo de aire se produce desde la parte frontal hacia atrás, de este modo es posible apilar varias unidades sin dejar espacio entre ellas. Sin embargo, es necesario dejar un espacio adecuado tanto en la parte frontal como en la parte posterior de la unidad para conseguir una ventilación eficaz. En el caso de montaje para Broadcast, el flujo de aire será de atrás hacia delante.

2.2.1.3 Reemplazo del módulo de alimentación

El chasis 4RU puede instalarse con uno o dos módulos de alimentación. Los módulos pueden intercambiarse desde la parte posterior de la unidad. Los chasis entregados con un sólo módulo, pueden ser actualizados adquiriendo un módulo de alimentación adicional.

Para las unidades con módulo de alimentación dual, si se pierde la alimentación en una de ellas, la otra puede alimentar a todo el chasis. Se recomienda conectar cada entrada de corriente a diferentes circuitos eléctricos.

2.2.2 Chasis 1RU

AppearTV ofrece 2 diferentes tipos de chasis 1RU. Uno es alimentado por un módulo sencillo de alimentación de 200 W CA y está disponible en los modelos DC1100/1101, SC2100/101 y MC3100/3101. El otro cuenta con un módulo de alimentación dual de 400 W CA o 500 W CD y está disponible en el modelo XC5100.

2.2.2.1 Modelos DC1100/1101, SC2100/101 and MC3100 /3101

El chasis 1RU consta de un total de 9 ranuras, mas una ranura dedicada para el módulo switch. Los módulos se pueden insertar en la parte delantera y en la parte trasera. Los que son insertados al frente no son intercambiables y sólo pueden ser cambiados mediante servicio de fábrica o en las instalaciones de servicio autorizadas. Sin embargo, los que son insertados en la parte posterior si pueden ser reparados directamente en el sitio. El módulo switch obligatorio se coloca en la ranura número 0 situada al frente en la esquina superior derecha, detrás de la cubierta frontal. La ranura número 1 se encuentra también al frente debajo del módulo switch y las ranuras 8 y 9 del lado izquierdo. Las ranuras número 2 al 7 se encuentran en la parte posterior como se puede apreciar en la Figura 2.16.

La ranura número 1 sólo soporta módulos IP IO y módulos descrambler. También permite estar sin ningún módulo conectado. Las ranuras 2 al 7 pueden tener cualquier módulo de 1 o 2 ranuras.

La Figura 2 .18 muestra la vista trasera y delantera del chasis 1RU incluyendo el modulo switch obligatorio, los conectores de alimentación y las ranuras de los módulos.

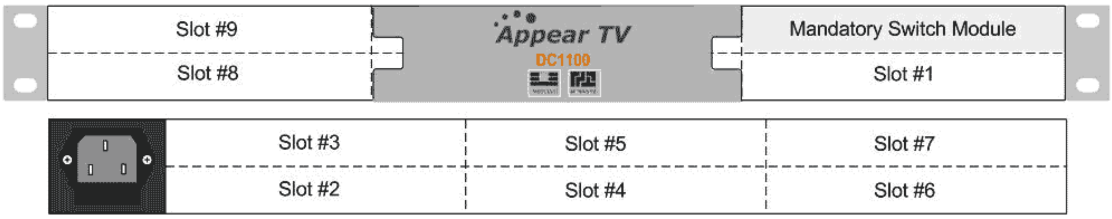


Figura 2.18 – Chasis 1RU con conectores de alimentación, módulo switch y ranuras disponibles; vista frontal y trasera.

2.2.2.2 Ventilación

Para el caso del chasis 1RU, el aire circula de izquierda a derecha, pudiendo apilarse varias unidades sin dejar espacio entre ellas. Sin embargo, para una ventilación eficaz, es necesario dejar un espacio adecuado a ambos lados.

El chasis 1RU viene con un único módulo de alimentación. En caso de fallo, el chasis debe enviarse a servicio de fábrica.

2.2.2.3 Modelo XC5100

El chasis 1RU del modelo XC5100 contiene un total de 6 ranuras, mas una ranura para el módulo Switch/IP. El módulo Switch/IP se inserta en la parte delantera del chasis, mientras que los módulos conectados en las otras 6 ranuras son insertados en la parte trasera. Todos los módulos son intercambiables, incluídos los módulos de alimentación y el módulo de ventilación del frente.

La figura 2.19 muestra la vista vista trasera y delantera del chasis 1RU incluyendo el modulo switch obligatorio, los conectores de alimentación y las ranuras de los módulos.

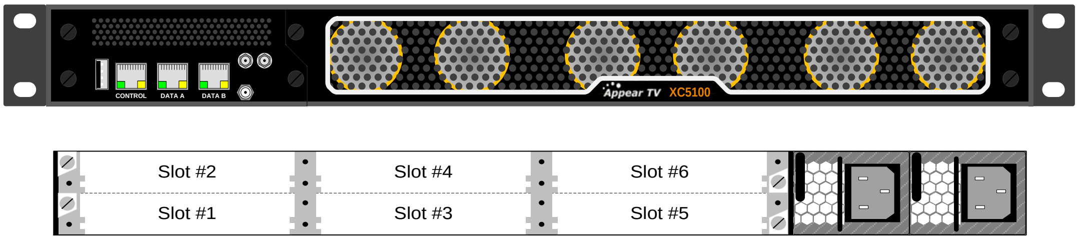


Figura 2.19– Chasis 1RU con conectores de alimentación, módulo switch y ranuras disponibles; vista frontal y trasera.

2.2.2.4 Ventilación

El modelo XC5100 cuenta con flujo de aire del frente hacia atrás, lo cual permite al usuario apilar varias unidades sin necesidad de dejar espacio entre ellas. Sin embargo, se debe dejar el espacio adecuado al frente y atrás de la unidad para una ventilación efectiva.

El XC5100 tiene 6 ventiladores al frente. La velocidad del ventilador es controlada de acuerdo a la temperatura. En caso de que uno de los ventiladores fallara, el resto de los ventiladores incrementará la velocidad para compensar. El módulo completo con los 6 ventiladores es intercambiable. Si, durante el proceso de reemplazo del módulo de ventilación, la temperatura excediera los límites tolerados por la unidad, ésta se apagará para prevenir un daño permanente en los módulos insertados.

2.2.3 Consideraciones de Seguridad

La unidad **debe** conectarse a una conexión aterrizada. Por otro lado, el conector de entrada actúa como disyuntor del módulo. Para quitar la alimentación del dispositivo, los cables de alimentación necesitan ser removidos físicamente del conector de entrada de alimentación.

	Instrucciones de Seguridad Obligatorias
1	El equipo debe ser instalado por una persona calificada.
2	Para aquellos equipos provistos con conexión a tierra, conecte el conductor antes de conectar el cable de alimentación. De modo opuesto, el cable de alimentación debe quitarse antes de desconectar el conductor de la conexión a tierra.
3	El equipo debe instalarse en una zona de acceso restringido donde: Sólo tendrán acceso técnicos calificados o usuarios que conozcan las medidas de seguridad más importantes. El acceso a la zona donde se encuentran instalados los dispositivos, será mediante una herramienta, candado y llave, o cualquier otro dispositivo de seguridad, y además el lugar estará controlado por una persona autorizada.

2.2.4 Instalación

2.2.4.1 Suministro de energía

El chasis 4RU cuenta con una entrada ya sea de 100-240 V CA 50/60 Hz o con 48 V CC. La fuente de alimentación de 100-240V CA 50/60 Hz tiene una capacidad máxima de 300 W, 400 W o 800 W3. La de 48 V DC soporta un máximo de 400 W o 800 W[4]. Las Figuras 2.20, 2.21, 2.22, 2.23, 2.24, 2.25 y 2.26 muestran las entradas de suministro de energía.

El chasis 1RU, en los modelos DC1100/1101, SC2100/101 y MC3100 /3101, cuenta con una entrada de 100-240 V CA 50/60 Hz y soporta un máximo de 200 W.

El modelo XC5100 puede estar equipado con un módulo de alimentación sencilla o dual de 100-240 V AC, 47-63 Hz, con soporte máximo de 400 W. También se tiene la opción de equiparlo con un módulo de alimentación sencilla o dual de -48 V CD, con soporte máximo de 500 W.

2.2.4.2 Chasis 4RU con 300 y 400 W CA

El chasis puede contener dos fuentes de alimentación para redundancia y tiene entradas de alimentación independientes para cada suministro.

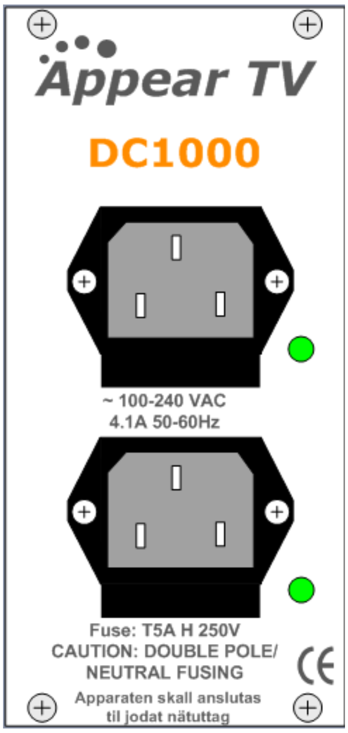


Figura 2.20 – Entrada de alimentación para chasis 4RU con 300 y 400 Watts de potencia de CA.

2.2.4.3 Chasis 4RU con 800W de potencia de CA

El chasis tiene dos fuentes de alimentación para redundancia con entradas de alimentación independientes. Las fuentes de alimentación y los conectores de entrada están situados en la parte posterior del chasis.

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[3] Contactar a Appear TV para más información.

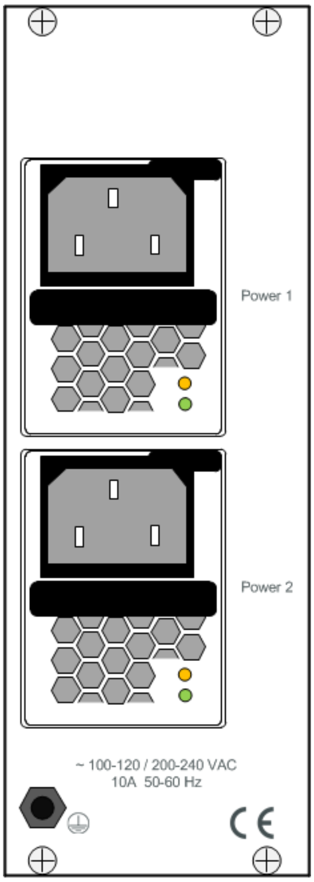


Figura 2.21 – Entrada de alimentación para chasis 4RU con 800 W de potencia de CA

2.2.4.4 Chasis 4RU con 400 W de potencia de DC (-48 Volts)

El chasis tiene dos fuentes de alimentación para redundancia con entradas de alimentación independientes. Las fuentes de alimentación y los conectores de entrada están situados en la parte posterior del chasis.

Figura 2.22 – Placa frontal de la fuente de alimentación de 48 V en un DC1000

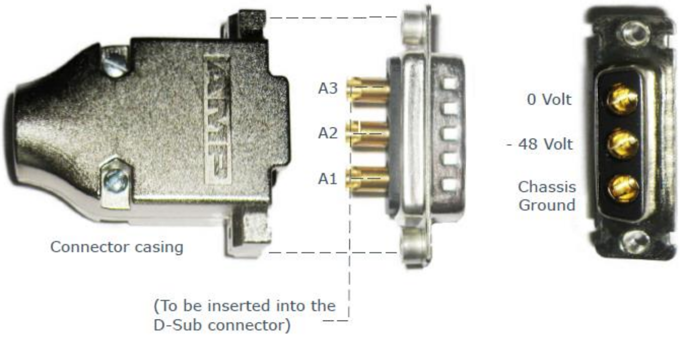


Figura 2.23 – Diseño del conector de 48V CD

2.2.4.5 Chasis 4RU con 800W de potencia de DC

El chasis cuenta con dos fuentes de alimentación independientes de -48 V de CC para proporcionar redundancia. Las fuentes de alimentación y las entradas de suministro de energía se encuentran en la parte trasera del chasis.

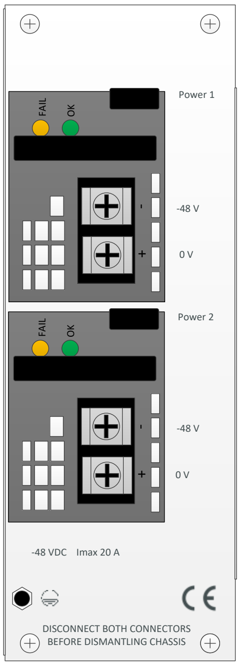


Figura 2.24 – Entrada de alimentación para chasis 4RU con 800 W de potencia de CC

2.2.4.6 Chasis 1RU Product models DC1100/1101, SC2100/101 and MC3100 /3101

El conector de entrada de alimentación se encuentra en la parte posterior de la unidad.

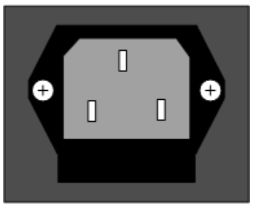


Figura 2.25 Conector de alimentación para el Chasis 1RU

2.2.4.7 Chasis 1RU modelo XC5100 con modulo de alimentación de CA

Los conectores de alimentación están localizados en la parte trasera de la unidad.

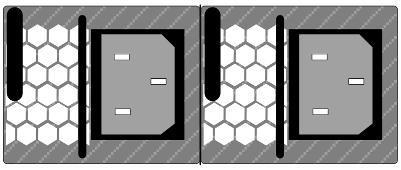


Figura 2.26 Conector de alimentación para el Chasis 1RUmodelo XC5100, con modulo de alimentación de CA

2.2.4.8 Chasis 1RU modelo XC5100 con modulo de alimentación de CD

Los conectores de alimentación están localizados en la parte trasera de la unidad.

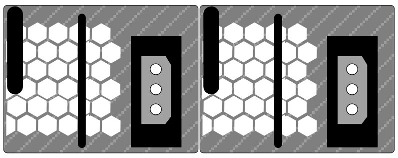


Figura 2.27 Conector de alimentación para el Chasis 1RUmodelo XC5100, con modulo de alimentación de CD

2.2.5 Información sobre residuos

Este producto no debería desecharse junto con los residuos domésticos. De acuerdo a la directiva WEEE, los proveedores de material eléctrico y electrónico deben garantizar que estos productos son eliminados adecuadamente.

Appear TV es miembro de Elretur AS, empresa noruega de nivel nacional dedicada a la recolección, reciclado y procesamiento de material eléctrico y electrónico desechado respetando el medio ambiente. De acuerdo con la normativa local puede devolver este producto a:

Appear TV AS,
Lilleakerveien 2b,
0283 Oslo, Norway

Una vez recibido, procederemos con el reciclaje de forma gratuita.
De igual modo puede llevar el producto al punto de reciclado de equipos eléctricos y electrónicos de su localidad.

Si ha adquirido este producto fuera de Noruega, puede ponerse en contacto con su distribuidor y solicitar información sobre los puntos de recogida de residuos municipales para su correcto reciclado.

2.3 Установка и безопасность (Russian Text)

Устройство предназначено предложить операторам надежность и гибкость. Оно состоит из шасси, в котором может быть установлено некоторое количество модулей. Для удовлетворения конкретных требований к системе, шасси может быть сконфигурировано для размещения функциональных модулей, которые лучше всего подходят для данного сценария.

Продукция Appear TV может поставляться в различных вариантах шасси - 1RU и 4RU. Модели DC1000/1001, SC2000/2001, MC3000/3001 и XC5000 представляют собой 4RU шасси, в то время как модели DC1100/1101, SC2100/2101, MC3100/3101 и XC5100 - 1RU шасси.

2.3.1 4RU шасси

4RU шасси состоит из в общей сложности 18 слотов, каждое из которых может содержать функциональные модули. Слот номер 0 предназначен для модуля коммутатора. Слот номер 17 может вместить как модули ввода, занимающие неснольно слотов, так и второй коммутационный модуль для конфигураций с избыточностью. Оставшиеся 16 слотов идентичны и могут быть заняты любым из доступных функциональных модулей. 4RU шасси, включая обязательный коммутационный модуль, блоки питания с избыточностью и слоты модулей, показано на рисунке 2.1 и 2.2. Силовые модули и модули вентиляторов вставляются с тыльной стороны шасси (Рис. 2.3 показывает модель XC5000).

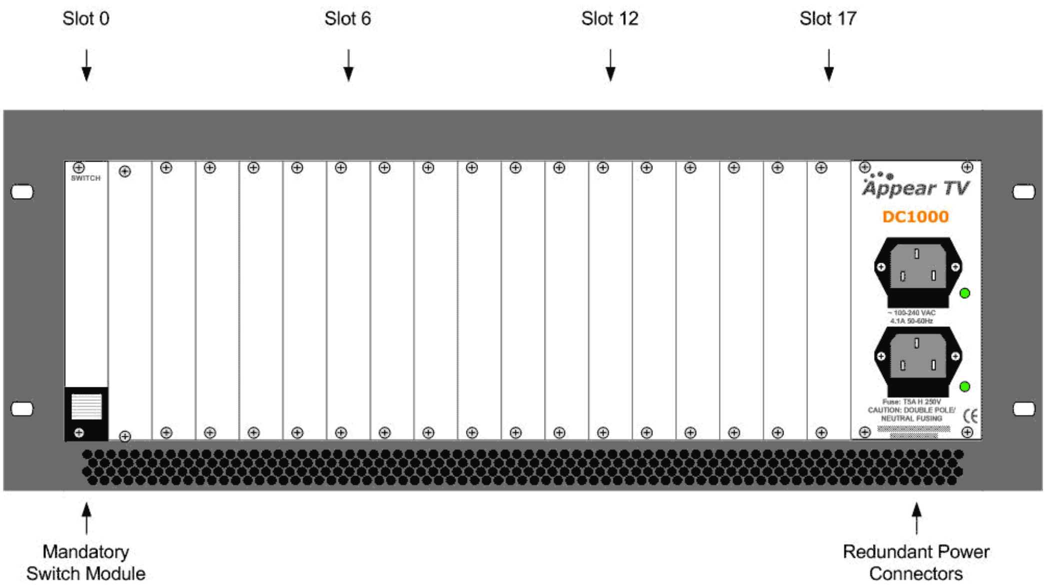


Рис. 2.28– 4RU шасси (DC1000/1001, SC2000/2001 and MC3000/3001) включая коммутационный модуль, разъемы питания с избыточностью и слоты модулей.

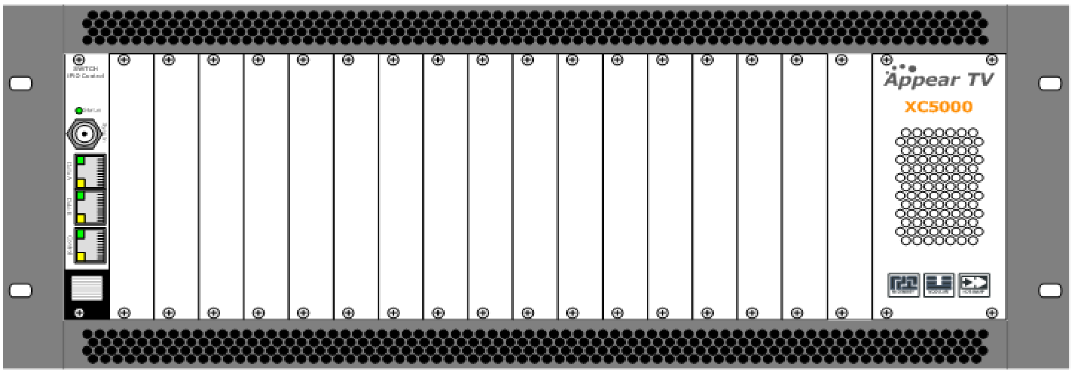


Рис. 2.29 – 4RU шасси (XC5000) вид спереди

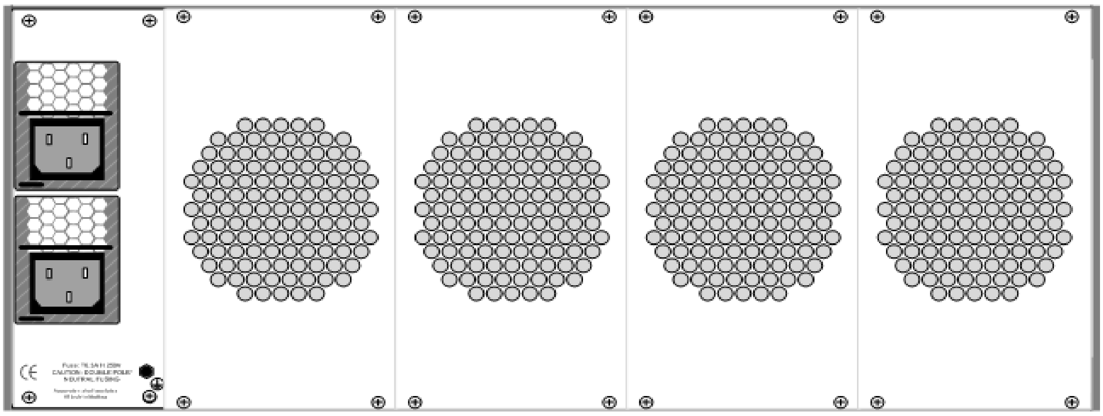


Рис. 2.30 – 4RU шасси (XC5000) вид сзади

2.3.1.1 Модели 4RU шасси: DC1000, DC1001, SC2000, SC2001, MC3000, MC3001 и XC5000

2.3.1.2 Охлаждение

4RU шасси с разъёмами спереди имеет принудительную вентиляцию, направленную с фронтальной стороны , что позволяет установить несколько шасси друг над другом без дополнительного места между ними. Тем не менее, достаточно места должно быть обеспечено спереди и сзади устройства для эффективной вентиляции. В шасси с разъёмами сзади, поток воздуха будет направлен от задней к передней стороне шасси.

2.3.1.3 Замена блока питания

4RU шасси может быть установлен один или два блока питания (XC5000 всегда поставляется с двумя блоками питания). Блоки питания могут быть заменены с задней стороны устройства. Шасси, которое поставляется с одним блоком питания, может быть обновлено за счет приобретения дополнительного блока питания.

В случае отказа одного из блоков питания, другой может обеспечивать всё шасси. Рекомендуется для подключения каждого из блоков использовать различные цепи питания.

2.3.2 1RU шасси

Appear TV предоставляет 2 различных шасси 1RU.Первое, с одним 200W блоком питания переменного тока доступно в моделях DC1100/1101, SC2100/101 и MC3100 / 3101. Второе, 1RU шасси с двумя 400W блоками питания переменного тока или двумя 500W блоками питаня постоянного тока доступно в модели XC5100.

2.3.2.1 Шасси моделей DC1100/1101, SC2100/101 и MC3100 /3101

Шасси состоит из 9 слотов плюс одно слот для модуля коммутатора. Модули могут быть установлены как с фронтальной так и с тыльной части шасси. Модули, которые устанвливаются в переднюю часть не поддерживают горячую замену и могут обслуживаться только производителем или авторизированным сервис центром. Однако, модули, устанавливаемые с задней стороны, могут быть заменены на месте.Обязательный модуль коммутатора находится в слоте 0, расположенном в переднем верхнем правом углу за передней крышкой. Слот 1 спереди под модулем коммутатора и слоты 8 и 9 находятся спереди слева. Слоты со 2 по 7 расположены на тыльной стороне, как показано на рисунке 2.2.

В слоте 1 могут находиться модуль IP IO или модуль дешифратора, либо ни одного модуля. Слоты 8 и 9 может поддерживать только модуль дешифратора. Слоты со 2 по 7 могут содержать любые доступные модули 1 или 2 слота шириной.

Рис 2.4 показывает вид спереди и сзади 1RU шасси включая обязательный модуль коммутатора, блок питания и слоты модулей.

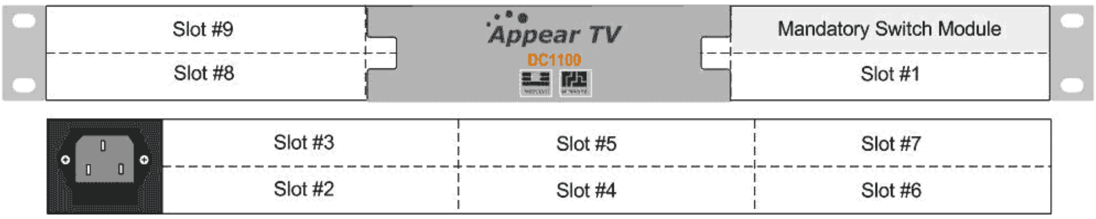


Рис. 2.31 - 1RU шасси с блоком питания, модулем коммутатора и доступными слотами модулей; вид спереди и сзади.

2.3.2.2 Охлаждение

1RU шасси имеет принудительную вентиляцию, направленную от левой стороны к правой, что позволяет установить несколько шасси друг над другом без дополнительного места между ними. Тем не менее, достаточно места должно быть обеспечено слева и справа устройства для эффективной вентиляции.

1RU шасси поставляется с одним блоком питания, в случае поломки шасси должно быть отправлено производителю.

2.3.2.3 Модель XC5100

Рис. 2.5 показывает вид спереди и сзади 1RU шасси модели XC5100, включая обязательный модуль коммутатора, блоки питания и слоты модулей.

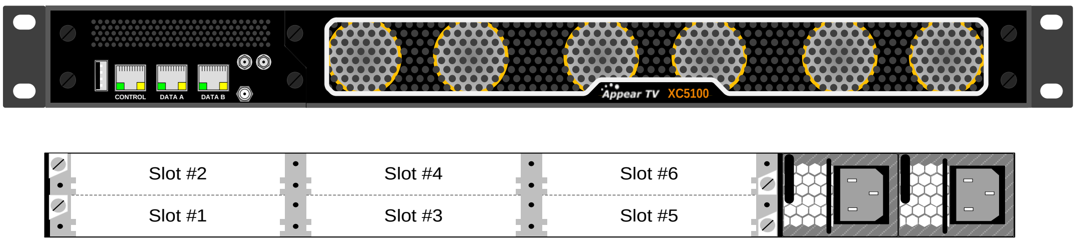


Рис. 2.32 - 1RU шасси модели XC5100 с двойным блоком питания, модулем коммутатора и доступными слотами модулей; вид спереди и сзади.

2.3.2.4 Охлаждение

XC5100 имеет принудительную вентиляцию, направленную с фронтальной стороны, что позволяет установить несколько шасси друг над другом без дополнительного места между ними. Тем не менее, достаточно места должно быть обеспечено спереди и сзади устройства для эффективной вентиляции.

XC5100 имеет 6 вентиляторов спереди. Скорость вращения вентилятора регулируется температурой. Если вентилятор не работает, остальные вентиляторы увеличивают скорость, чтобы компенсировать. Весь модуль охлаждения, содержащий все 6 вентиляторов, может подлежать горячей замене. Если во время замены модуля охлаждения, температура на установленных модулях превышает некоторую критическую температуру, шасси выключится, чтобы предотвратить повреждение установленных модулей.

2.3.3 Соображения безопасности

Устройство должно быть подключено к заземленной электрической сети. Чтобы отключить электропитания от устройства, силовые кабели должны быть физически удалены из входного разъема питания.

	Обязательные инструкции по технике безопасности
1	Оборудование должно быть установлено квалифицированным человеком
2	Для оборудования с заземлением, подключите заземление перед подключением кабеля питания. Наоборот, шнур питания должен быть отсоединён перед отсоедененением заземления.
3	Оборудование должно быть установлено в месте с ограниченным доступом, при этом: • Доступ будет разрешён только для квалифицированного технического персонала или тем, кто знает необходимые меры безопасности. • Доступ в помещение, где установлено оборудование, должен осуществляться с помощью инструментов, быть ограничен замком или другим подобным устройством, также место должно контролироваться уполномоченным человеком.

2.3.4 становка

2.3.4.1 Характеристики блоков питания

4RU шасси поставляться либо с 100-240В 50/60 Гц блоком питания переменного тока или с блокоми питания постоянного тока -48В постоянного тока. Блок питания 100-240В 50/60 Гц рассчитан на максимум 300 Вт, 400 Вт или 800 Вт[1]. Блок питания -48В постоянного тока рассчитан на максимальные 400 Вт. Рисунки 2.6. 2.7, 2.8, 2.9, 2.10, 2.11 и 2.12 ниже показывает входы питания.

1RU шасси поставляется с блоком питания переменного тока 100-240В 50/60 Гц. Максимальная мощность для продукта моделей DC1100/1101, SC2100/101 и MC3100 / 3101 200 Вт.

Модель шасси XC5100 1RU, поставляется с одним или двумя блоками питания переменного тока 100-240В, 47-63Гц, мощностью 400Вт, также с одним или двумя блоками питания постоянного тока -48V, мощностью 500Вт.

2.3.4.2 4RU шасси с 300 и 400Вт блоками питания переменного тока

В шасси может быть установлено два блока питания для избыточночти, каждый из которых имеет независимые разъёмы питания.

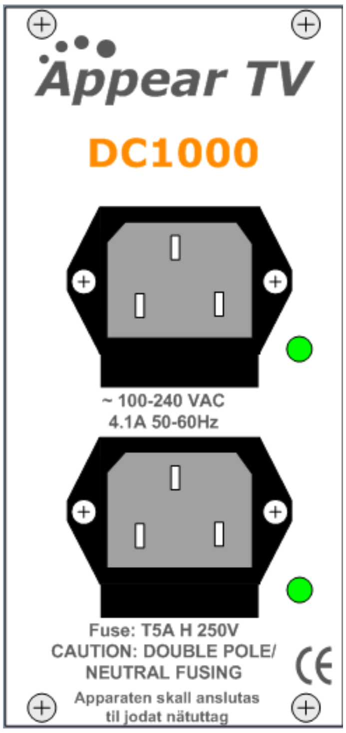


Рис. 2.33 – Разъёмы питания для 4RU шасси с 300 и 400Вт блоками питания переменного тока

2.3.4.3 4RU шасси с 800Вт блоком питания переменного тока

В шасси установлено два блока питания для избыточночти, каждый из которых имеет независимые разъёмы питания.

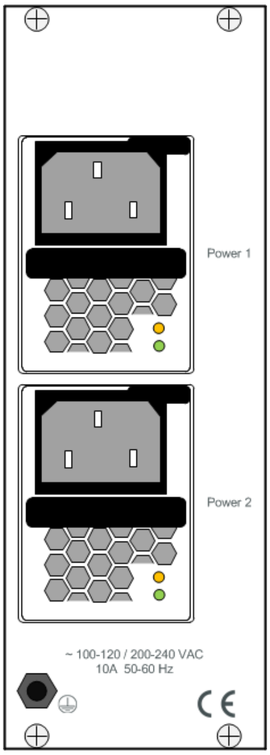


Рис. 2.34- Разъёмы питания для 4RU шасси 800Вт блоками питания переменного тока

2.3.4.4 4RU шасси с 400Вт (-48Volt) блоком питания постоянного тока

В шасси может быть установлено два блока питания для избыточночти, каждый из которых имеет независимые разъёмы питания.

Рис. 2.35 - Передняя панель двойного блока питания 48В в шасси DC1000

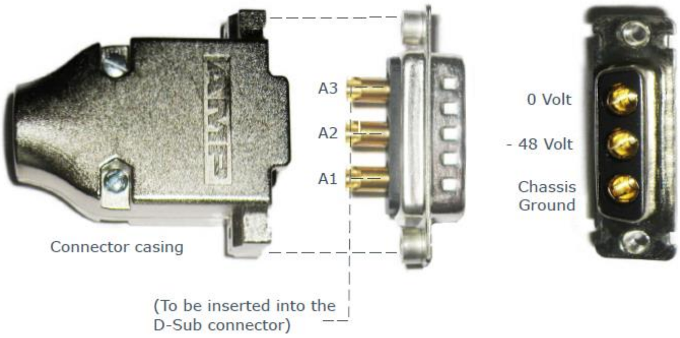


Рис. 2.36 - Компоновка 48В разъёма питания постоянного тока

2.3.4.5 4RU шасси с 800Вт (-48Volt) блоком питания постоянного тока

В шасси установлено два блока питания по 48В (постоянный ток) для избыточночти, каждый из которых имеет независимые разъёмы питания. Блоки питания и входные отверстия для кабелей с винтовым зажимом расположены на задней панели шасси.

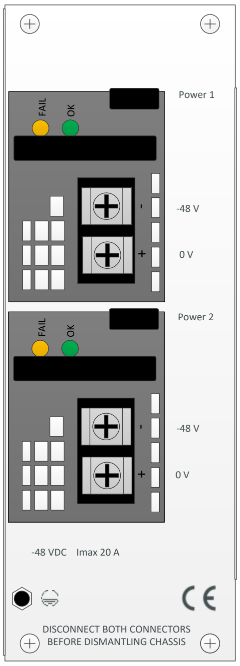


Рис. 2.37 - Блок питания для 4RU шасси с 800Вт постоянного тока

2.3.4.6 1RU шасси моделей DC1100/1101, SC2100/101 и MC3100 /3101

Разъём питания расположен с тыльной стороны шасси.

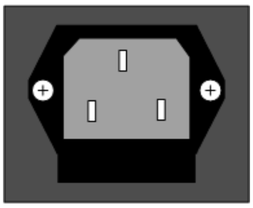


Рис. 2.38 Разъём питания 1RU насси, моделей DC1100/1101, SC2100/2101 и MC3100/3101

2.3.4.7 1RU шасси модели XC5100 с блоком питания переменного тока

Разъёмы питания расположены с тыльной стороны шасси.

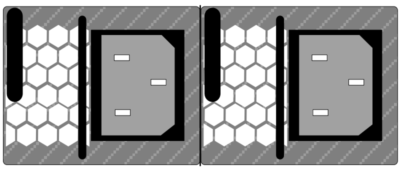


Рис. 2.39 Разъём питания 1RU насси, модели XC5100 с источником питания переменного тока

2.3.4.8 1RU шасси модели XC5100 с блоком питания постоянного тока

Разъёмы питания расположены с тыльной стороны шасси.

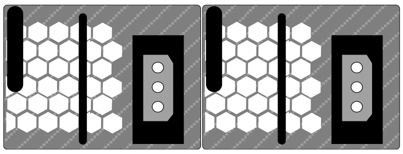


Рис. 2.40 Разъём питания 1RU насси, модели XC5100 с источником питания постоянного тока

2.3.5 Информация по утилизации электрического и электронного оборудования

Данный продукт нельзя выбрасывать вместе с остальными бытовыми отходами. Согласно директиве WEEE об утилизации отходов электрического и электронного оборудования, компании, которые занимаются продажей данного оборудования, должны обеспечить его утилизацию в условиях, не причиняющих ущерб окружающей среде.

Appear TV является членом Elretur AS – норвежской компании, занимающейся на территории страны сбором и переработкой использованного электрического и электронного оборудования, используя при этом процессы, не наносящие ущерба экологии. В соответствии с местными требованиями, у Вас есть возможность вернуть продукт по следующему адресу:

Appear TV AS,
Lilleakerveien 2b,
0283 Oslo, Norway

Мы бесплатно примем отработанное оборудование для его дальнейшей переработки. Вы также можете его сдать в ближайший пункт сбора отходов электрического и электронного оборудования.

Если продукт был куплен не на территории Норвегии, Вы можете связаться с Вашим торговым посредником, с целью получения информации о пунктах сбора по переработке данного продукта.

3 Physical Module Configuration

3.1 Connecting switch modules

Configuration, management and monitoring of you Appear TV unit has done via the management port on the switch module. The switch module will contain the database for the full configuration of the unit. One switch module (in some configuration two switch modules) must be installed in all 1 RU and all 4 RU chassis.

Please refer to product datasheets for module identification.

	Appear TV strongly recommends that all management IP interfaces are located on a secure internal network only accessible by authorised personnel.

3.1.1 Switch module with MMI

The switch module is equipped with one electrical connector (RJ45) for management. Automatic sensing of 10/100/1000Mbit Ethernet connections is supported. For a 1000Mbit connection, the Ethernet cable must be a category 6 cable.

The management port should be connected to your management network. Please refer to section 0 for configuration.

3.1.2 Switch module with MMI and IP IO

The switch module with management and two data ports is equipped with three electrical connectors (RJ45) or one electrical connector (RJ45) and two SFP connectors. Two RJ45 electrical connectors or two SFP connectors are for data. The last RJ45 electrical connector is for management

Automatic sensing of 10/100/1000Mbit Ethernet connections is supported on all RJ45 ports. For a 1Gbps connection, the Ethernet cable must be a category 6 cable.

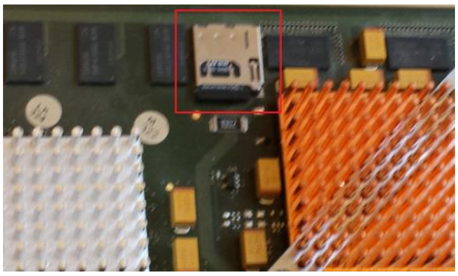
The management port should be connected to your management network and the data port to you data network carrying the video streaming content. Please refer to section 0 for configuration.

Each port have a unique IP address and both data ports can be used at the same time as wither 2 IP input ports (seamless or standalone), 2 IP output ports (cloned or standalone) or 1 IP input and 1 IP output port.

3.2 MMI MicroSD Installation

In order to enable TS Insertion and Logo Insertion for the Encoder modules, a MicroSD card will need to be installed in the MMI module. This will require physical removal of the MMI module from the unit.

Once the module has been removed, you will need to take the MicroSD card provided by Appear TV and insert this into and 'click' this into the MicroSD holder as shown below:



In order to remove the MicroSD card, this can be pushed and then removed.

The MicroSD card must be pre-formatted with a FAT32 file system.

3.3 Connecting Input Signals

Please refer to product datasheets for module identification.

3.3.1 IP Input

This applies to the following modules:

- Standalone IP Input
- Dual IP module (Input mode)

The standalone IP input module is equipped with two electrical connectors (RJ45) and one SFP connector. One RJ45 electrical connector and the SFP connector are for data. The second RJ45 electrical connector marked "control" is not in use. It is not required to configure the IP address or connect the port to the IP network.

The Dual IP module is equipped with two electrical connectors (RJ45) and two SFP connector.

Automatic sensing of 10/100/1000Mbit Ethernet connections is supported. For a 1000Mbit connection, the Ethernet cable must be a category 6 cable.

The IP address for both the electrical (RJ45) and the optical (SFP) connectors for data is the same. Consequently, both connectors cannot be used simultaneously. These inputs are automatically activated by IP connection. The first port activated (by establishing a link to the router) will be the active port. To activate the other port, remove the cable from the active port.

3.3.2 ASI Input

Each ASI input module has three independent ASI inputs. The ASI connector is a 75Ω BNC connector. The maximum input rate per connector is 212Mbit/s in burst mode.

The ASI module is equipped with an electrical connector (RJ45) marked "control" that is not in use. It is not required to configure the IP address or connect the port to the IP network.

3.3.3 DVB-S/S2 Input

The DVBS-S/S2 supports both DVB-S (QPSK) and DVB-S2 (with DVB-S2 license). Each DVB-S/S2 input module has 4 independent L-Band inputs. Each input is a 75Ω F that can be connected either directly to an LNB, an L-Band distribution amplifier, or switch. The maximum input level is -25dBm. The recommended input level is between -30dBm and -40dBm.

One ASI output port is available for monitoring. Any of the four L-Band inputs can be copied to the ASI output without affecting the services in use. The ASI connector is a 75Ω BNC connector.

3.3.4 DVB-S2X Input

The DVBS-S/S2 supports both DVB-S (QPSK), DVB-S2 (with license) and DVBS2X input (with license). Each DVB-S/S2 input module has 4 independent L-Band inputs. Each input is a 75Ω F that can be connected either directly to an LNB, an L-Band distribution amplifier, or switch. The maximum input level is -25dBm. The recommended input level is between -30dBm and -40dBm.

3.3.5 COFDM Input

Each COFDM input module has one 75Ω F connector. The input is distributed to four tuners internally, so each module can receive four independent frequencies. The maximum input level is -15dBm. The recommended input level is between -30dBm and -50dBm. (An older version of this module exists with different input levels.)

One ASI output port is available for monitoring. Any of the four COFDM inputs can be copied to the ASI output without affecting the services in use. The ASI connector is a 75 Ω BNC connector.

3.3.6 DVB-T/T2 Input

Each DVB-T/T2 input module has one or four 75Ω F connector. For the module having one input connector, the input is distributed to four tuners internally, so each module can receive four independent frequencies. For the module with 4 inputs, each input is directly connected to a tuner. The maximum input level is -10dBm (both modules). The recommended input level is between -20dBm and -40dBm (optimal lever will depend on modulation used).

3.3.7 QAM A/C Input

Each QAM input module has one 75Ω F connector. The input is distributed to four tuners internally, so each module can receive four independent frequencies. The maximum input level is -15dBm. The recommended input level is between -30dBm and -50dBm.

For variants with an ASI output port, this is available for monitoring. Any of the four QAM inputs can be copied to the ASI output without affecting the services in use. The ASI connector is a 75Ω BNC connector.

3.3.8 8VSB Input

Each 8VSB input module has four independent 75Ω F connectors.

One ASI output port is available for monitoring. Any of the four 8VSB inputs can be copied to the ASI output without affecting the services in use. The ASI connector is a 75Ω BNC connector.

The 8VSB module is equipped with an electrical connector (RJ45) marked "control" that is not in use. It is not required to configure the IP address or connect the port to the IP network.

3.3.9 QAM-B Input

Each QAM-B input module has four independent 75Ω F connectors.

One ASI output port is available for monitoring. Any of the four QAM-B inputs can be copied to the ASI output without affecting the services in use. The ASI connector is a 75Ω BNC connector.

The 8VSB module is equipped with an electrical connector (RJ45) marked "control" that is not in use. It is not required to configure the IP address or connect the port to the IP network.

3.3.10 ISDB-T Input

Each ISDB-T input module has one 75Ω F connector. The input is distributed to four tuners internally, so each module can receive four independent frequencies. The maximum input level is -10dBm. The recommended input level is between -30dBm and -50dBm.

3.3.11 SDI Encoder

The SDI Encoder module has 4 BNC inputs that vary in functionality depending on the mode. These functions are as follows:

- SD Encoder – Port A, B, C and D are in SDI mode and link to the 4 corresponding internal encoder ports

- HD Encoder – Port A and B are in HD-SDI mode and link to the 2 corresponding internal encoder ports
- HD + AES Encoder – Ports marked HDSDI A and AES A link to channel A internally while HDSDI B and AES B link to channel B
- Universal HVQ Encoder – In HD, port A is in HD-SDI mode, in SD, port A and B are in SDI mode
- Universal Dense Encoder- In 4 HD and 4 SD mode.

3.3.12 Analog Encoder

The Analog encoder module has 4 High Density BNC input ports which correspond to the internal ports. As well as this, there is one HD DSUB 26 male connector for audio. The pin-out for this is as follows:

Pin #	Function
1	A Right +
2	A Right -
3	B Right +
4	B Right -
5	GND
6	C Right +
7	C Right -
8	D Right +
9	D Right -
10	GND
11	GND
12	AES 1 +
13	AES 1 -
14	GND
15	AES 2 +
16	AES 2 -
17	GND
18	GND
19	A Left +
20	A Left -
21	B Left +
22	B Left -
23	C Left +
24	C Left -
25	D Left +
26	D Left -

3.3.13 Audio Processor

The Audio Processor module in SDI Encoder mode had 4 BNC inputs. These ports each accept an SDI input which can contain up to 8 embedded AES audio pairs.

3.4 Connecting Processing Modules

3.4.1 EPG

The EPG Module is available as two different hardware options, EP-100 (ASIO based) and EP-110 (Bamboo based). If required, this module can be connected to an IP network to facilitate EPG Schedule import and export and if this is required, the following ports will need to be connected:

- EP-!oo: Control Port
- EP-110: Dataport A

3.5 Connecting Output Signals

3.5.1 IP Output

This applies to the following modules:

- Standalone IP Output
- Dual IP module (Output mode)

standalone IP output card is equipped with both an electrical connector (RJ45) and one optical (via the SFP module) for data. The RJ45 connector marked "control" is not in use. It is not required to configure the IP address or connect the port to the IP network.

The Dual IP module is equipped with two electrical connectors (RJ45) and two SFP connector.

Automatic sensing of 10/100/1000Mbit Ethernet connections is supported. For a 1000Mbit connection, the Ethernet cable must be a category 6 cable.

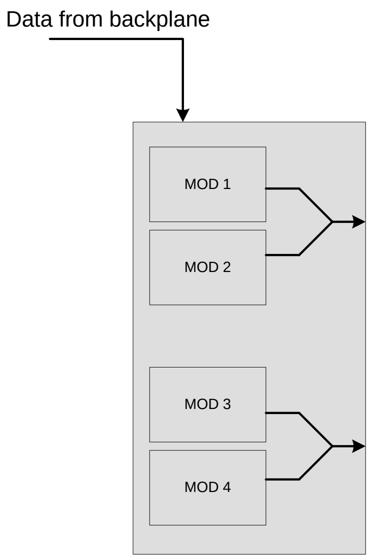
The IP address for both the electrical (RJ45) and the optical (SFP) connectors for data is the same. Consequently, both connectors cannot be used simultaneously. These inputs are automatically activated by IP connection. The first port activated (by establishing a link to the router) will be the active port. To activate the other port, remove the cable from the active port.

3.5.2 ASI Output

Each ASI output module has four independent ASI outputs. The ASI connector is a 75Ω BNC connector. The maximum output rate per connector is 212Mbit/s in burst mode.

3.5.3 QAM Output

Each QAM output module has two 75Ω F connectors which carry up to sixteen frequencies.



The QAM modulator consists of four modulator chips, each carrying up to 4 carriers. The frequency is set only for the first carrier of each modulator. The remaining three carriers per modulator follow regular spacing.

QAM Modulator board

3.5.4 COFDM Cable Output

Each COFDM output module has two 75Ω F connectors which carry up to four frequencies.

3.5.5 MPEG-2/4 SD/HD SDI Decoder

The MPEG-2/4 SD/HD decoder enables decoding in either MPEG-2 SD/HD or MPEG-4 AVC SD/HD format. The module has two outputs that can be either SDI or HD-SDI with embedded audio and VBI.

It is possible to configure the decoder's channel B to route its audio outputs to channel A, resulting in channel A (the first two output ports) having the video stream along with four different audio tracks. Channel B will then have no output.

There are two steps involved to obtain this configuration:

On the module itself, set dip switch 6 to on.

In the GUI, set **Input Source** for both **Output A** and **B** to the same video stream.

i	To run HD content, a pair of HD/SDI approved BNC connector and cable is necessary.

3.5.6 MPEG-2/4 SD/HD Composite Decoder

The MPEG-2/4 SD/HD decoder enables decoding in either MPEG-2 SD/HD or MPEG-4 AVC SD/HD format. The module has two composite BNC outputs for video and one HD DSUB 26 male connector for audio. The pin-out for this is as follows:

Pin #	Function
1	A1 Right +
2	A1 Right -
3	A2 Right +
4	A2 Right -
5	GND
6	B1 Right +
7	B1 Right -
8	B2 Right +
9	B2 Right -
10	GND
11	GND
12	A AES3 +
13	A AES3 -
14	GND
15	B AES3 +
16	B AES3 -
17	GND
18	GND
19	A1 Left +
20	A1 Left -
21	A2 Left +
22	A2 Left -
23	B1 Left +
24	B1 Left -
25	B2 Left +
26	B2 Left -

3.5.7 MPEG-2/4 SD/HD High Performance Decoder with RF Modulation

The High Performance Dual Decoder Module will provide two PAL modulated and RF up-converted services with excellent RF characteristics. The RF up-converted output for the two channels are combined internally and presented on a single female F connector.

The module has a test output with both channels; the test output connector is a single female F connector and the power level is -23dB from the main output.

The module covers the complete VHF/UHF band from 47MHz to 862MHz and NICAM or A2 stereo is provided as an SW option. A module delivered as mono can later be upgraded to support NICAM or A2 stereo by purchasing a SW license.

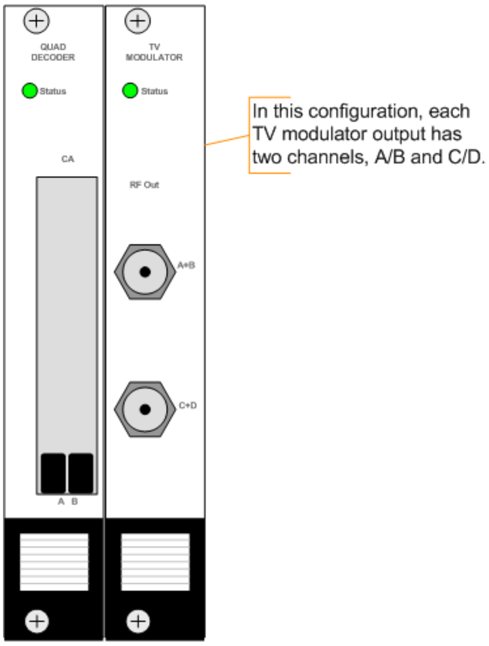
The RF output can be muted with an external unit by applying 5V to the mute connector. Channel A and Channel B can be muted individually. The connector for **Mute** is a 2.5 mm headphone jack. For more information on this functionality, contact Appear TV's Support Team.

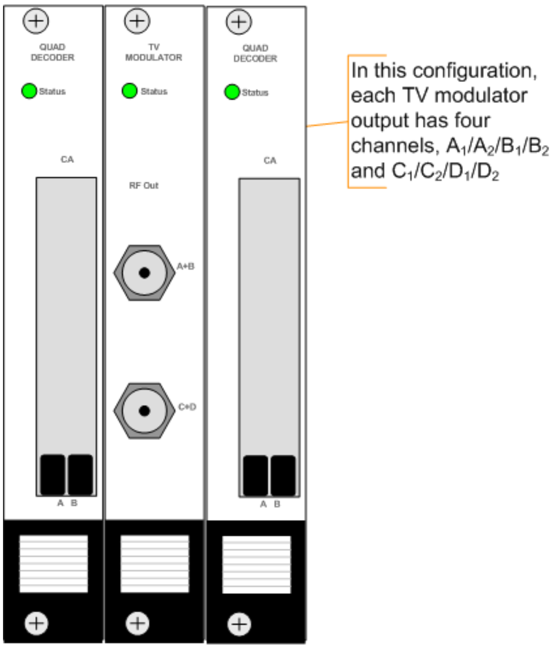
The High Performance Dual Decoder with RF Modulation and Stereo sound is two slots wide.

3.5.8 Quad Decoder with RF Output

The Quad Decoder solution consists of up to 1 or 2 individual decoder modules and a TV modulator. Each decoder module decodes 4 MPEG-2/4 services and the TV modulator modulates up to 8 analog RF TV channels.

With the 4 channel solution (two slots wide, see figure below all the channels are fully agile and can be set to any frequency in the UHF/VHF range. On the other hand, the 8 channel solution (three slots wide, see figure below) has 2x2 channels paired with neighboring channels.





Refer to Section 0 for information on how to configure the decoder.

3.5.9 FM Radio Output

The FM radio module has built-in FM modulation and up-conversion to the FM band. Its FM up-converted output is a female F connector.

Each module is one slot wide and can offer up to eight channels. The FM output can cover the complete band from 87.5MHz to 108MHz. All eight channels are combined into a female 75 Ω F connector.

The options to enable RDS or insert RDS information, as well as enable outside management are presented in the GUI.

The RF output can be muted with an external system by applying 5V to the mute connector. Muting the input mutes all channels available on the RF output connector.

3.5.10 DVB-T/T2 Output

The DVB-T/T2 output module has 4 50 Ohm BNC outputs, two for output A and two for output B. Both outputs have a RF and Test port. The RF port will output the level configured in the system while the Test port will be 20 dB lower and can be used for monitoring.

3.5.11 DVB-S/S2/S2X Output

There are three variations of the DVB-S/S2 output module:

- DVB-S/S2 L-Band Output – This module has two SMA RF outputs (50 Ohm), one for each of the output channels A and B, and two monitor ports which are F-Type connectors (75 Ohm). The RF level of the monitor ports is 20 dB below that configured in the GUI for the RF outputs.

  The RF output can be muted with an external unit by applying 5V to the mute connector. Channel A and Channel B can be muted individually. The connector for Mute is a 2.5 mm headphone jack. For more information on this functionality, contact Appear TV's Support Team.

- DVB-S/S2 IF Output – This module has 4 F-Type connectors which are 75 Ohm outputs. For each port there is a RF and Test port. The RF port corresponds to the output power level configured in the GUI, while the Test is the same level -20dB.

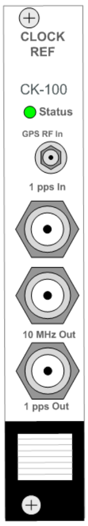
- DVB-S/S2/S2x Output. The DVBS2x output two SMA RF outputs (50 Ohm) for L-Band output and IF monitoring and two F-Type connectors (75 Ohm) for IF output and L-Band monitoring. In addition it features the ability to support 10MHz reference output.
  The RF output can be muted with an external unit by applying 5V to the mute connector. Channel A and Channel B can be muted individually. The connector for Mute is a 2.5 mm headphone jack. For more information on this functionality, contact Appear TV's Support Team.

3.5.12 ISDB-T-Cable Output

Each ISDB-T cable output module has two 75Ω F connectors which carry up to eight frequencies (four per connector)

3.6 Connecting Clock Reference Signals

The Clock Reference module is used to generate a synchronized PPS and 10 MHz reference signal to be used by the MMI module for various applications. The clock source can be a signal from a GPS antenna or an external PPS signal.



3.6.1 XC5000 4RU Clock Reference Module

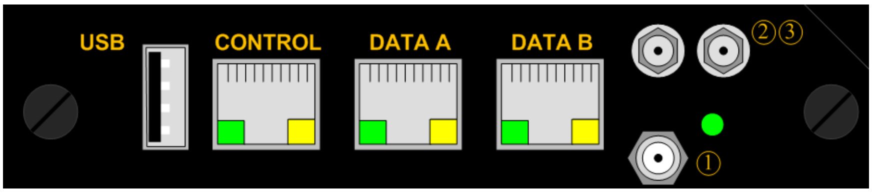
The module can power an active GPS antenna with 3.3V or 5.0V. The default output voltage is 3.3V, but this is selectable with the jumper close to the antenna input cable

The ports are labelled on the module and have the option for:

- GPS Input signal (SMA)
- 1 PPS Input (BNC)
- 10 MHz Output (BNC)
- 1 PPS Output (BNC)

3.6.2 XC5100 1RU Clock Reference Module

The configurations of the ports are as follows:



- Connector 1 (HD-BNC): 10Mhz or Genlock input (selectable on Admin->Clock Reference page)
- Connector 2 (SMA): PPS Input (by default) or PPS Output (if GPS input is used). This can be selected on the Admin->Clock Reference page)
- Connector 3 (SMA): used for GPS Input

4 Administrative Settings Configuration

This chapter describes how to conduct initial configuration of the unit, such as setting its IP address, changing the GUI's password, setting the unit's time as well as handling licenses for the modules in the unit.

4.1 Accessing the Web Interface

All modules in the unit are controlled via the web interface provided with it. The unit Man Machine Interface (MMI) software runs on the switch module via the connector marked as "Control"

Default MMI IP address is 192.168.1.100. To change the network settings of the device please follow the steps described below.

Connect a PC directly to the device (the Ethernet port marked "Control" on the switch module) with an Ethernet cable.

Set the IP address of the Ethernet adapter of the PC to a fixed address in the same segment (e.g. 192.168.1.99). Refer to the operating system's manual for details on setting the IP address on the PC.

Start an internet web-browser and type 192.168.1.100 in the address field. This application was developed and tested to work properly in the following browsers:

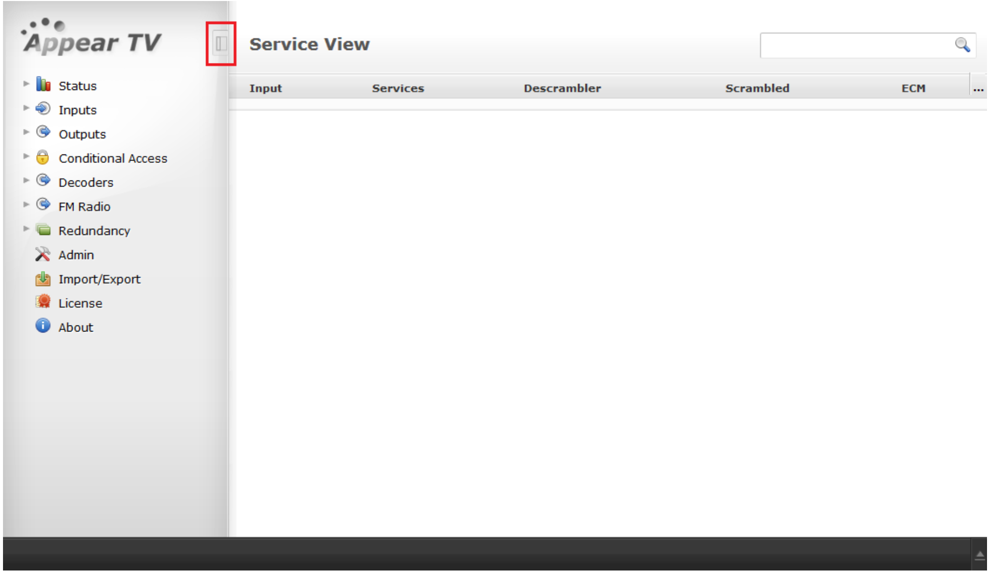
- Mozilla Firefox 11.xx and above
- Microsoft Internet Explorer 11 and above
- Opera 9.xx and above
- Google Chrome

Browsers that are not in this list have not been tested for compatibility.

Ensure that caching is disabled in the web browser.

If you have previously connected to a unit with the same IP address, the ARP table on your computer might be inaccurate. To delete the old ARP entry, type arp-d 192.168.1.100 in a command prompt.

The following screen will appear though the exact configuration of the unit will vary.



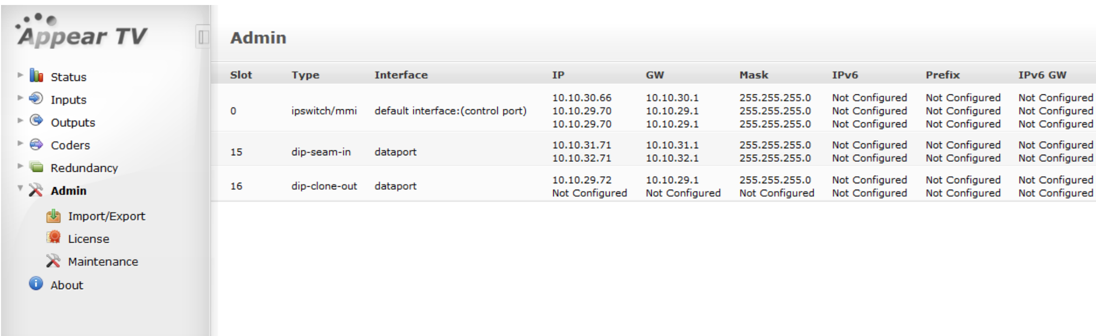
The screen area is divided into several sub-areas: a **Navigation Pane** on the left, a main display page on the right and footer at the bottom of the page. The **Navigation Pane** is used to access various nodes, while the footer displays alarms. Please note that the alarm area can be expanded by clicking on the arrow in the right bottom corner.

The button highlighted in the above figure toggles between the auto-hiding and always visible **Navigation Pane** modes. In auto-hide mode, the **Navigation Pane** frees up the space for the main pane. This is useful not only for devices with smaller screens such as netbooks but also for viewing large tables of data on the main pane.

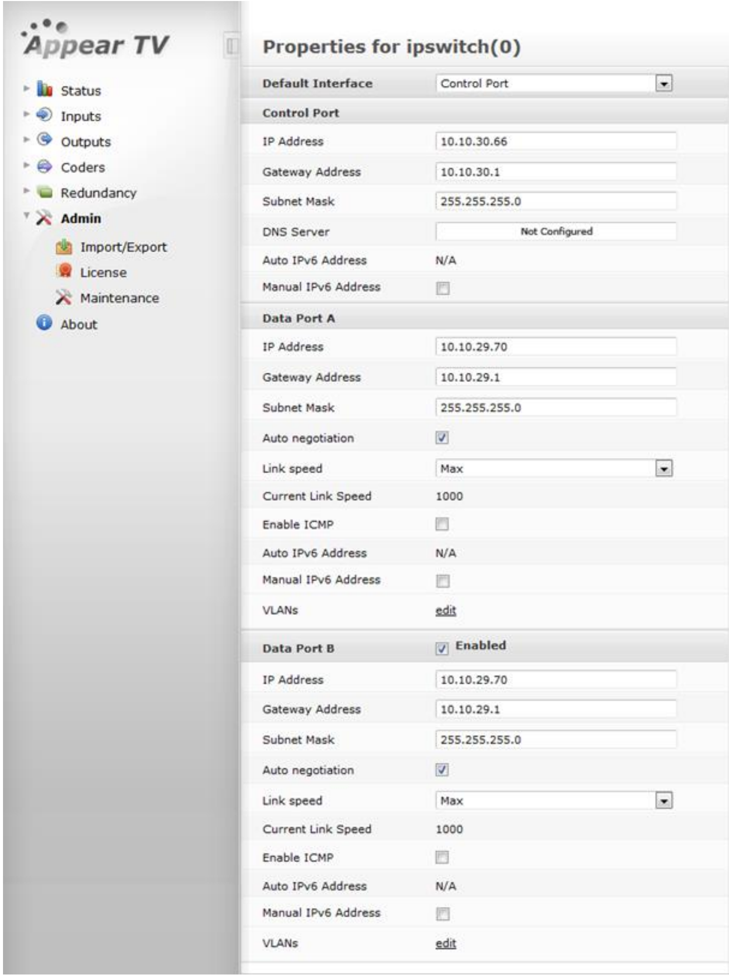
By default, this feature is disabled, and the **Navigation Pane** is always visible.

4.1.1 Assigning an IP Address

Click on the Admin node in the **Navigation Pane** and the window in the figure below will be displayed. This window shows all installed modules with their respective network settings; the MMI module is in slot 0 or slot 17 (marked as *mmi* in **Type**).



Select the switch module hosting the MMI and a module configuration similar to the one below will be displayed.



In the **Admin Properties** view, it is possible to configure the **Default Interface**, **Control Port**, and **Data Port**. **Control ports** on all input, output and processing except scrambling, bulk descrambling and EPG modules do not need to be configured.

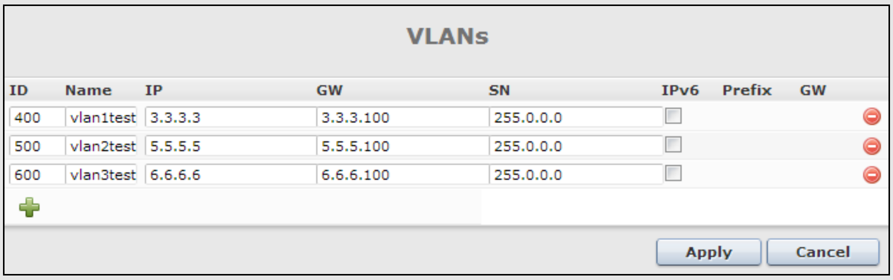
Default Interface	This parameter allows you to select the **Management Port** to be used for managing the Web GUI. For Switch modules with IP interfaces, the **Management Port** can be the **Control Port**, **Data Port**, or a **VLAN** (previously added).

<u>Control Port</u>

IP Address	IP address used solely for management. It cannot be used for multicast reception as it is not for data input.
Gateway Address	Gateway address of the network used for management
Subnet Mask	Subnet mask
DNS Server	Specify DNS Server for Control port applications (ie NTP)

<u>Data Port</u>

IP Address	IP address used for multicast reception
Gateway Address	Gateway address of the network used to access external resources

Subnet Mask	Subnet mask
Auto Negotiation	Enabled or disabled
Link Speed	Choose from: • Max • 100 • 1000
Current Link Speed	Current detected link speed of the Ethernet interface
Enable ICMP	By default all ports on the Dataport are closed (ie firewall). Enabling this option enables the port for 'ping' to be open. See further details in 4.1.4.
VLANs	The IP Input and IP Output ports can support up to 25 Virtual LANs (VLANs) depending on the module type and they can be defined in the **Admin Properties** view. The VLANs may then be associated with IP input streams when configuring input multicasts. To add and remove VLANs, click **edit**. The dialog below will be displayed:  Click to add VLAN tags and to remove them. If an active VLAN is removed, the associated IP inputs are reset so that they will not be part of that particular VLAN group.

Save the settings and connect the unit to your local network. Reconnect to the Web GUI using the MMI address.

	Please note that the following addresses ranges are reserved for internal use and not available to be configured: Switch: 192.168.0.xxx Switch w/ IP: 192.168.0.xxx and 192.168.2.xxx

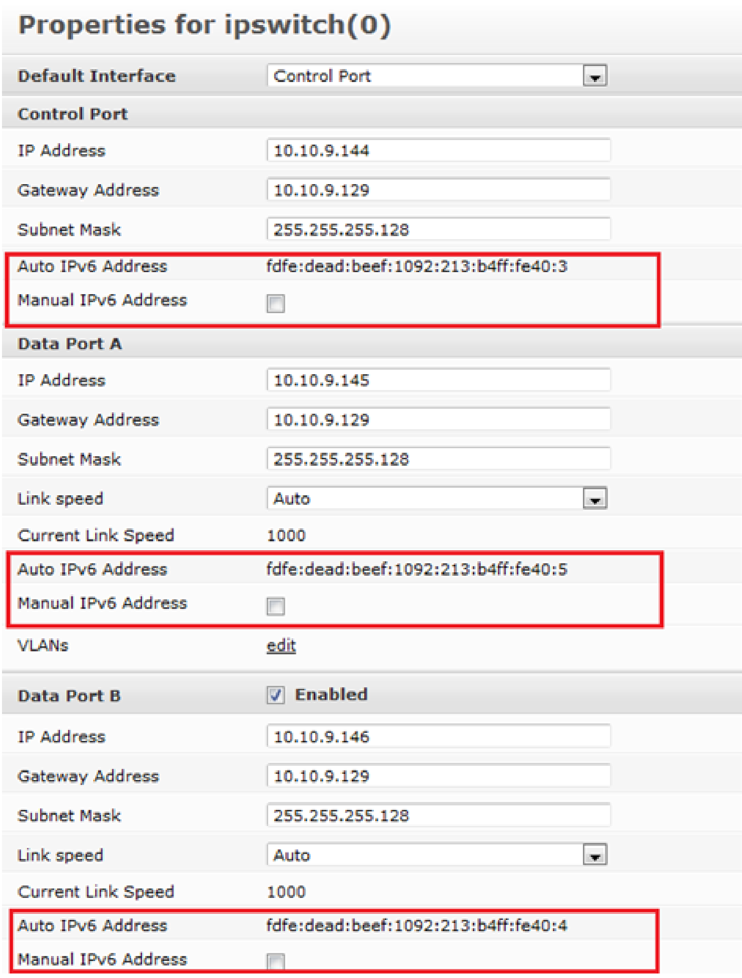
4.1.2 IPv6 Address Support

IPv6 support is available for management and data ports of the Switch module, both Control and IP versions. The following options are supported:

- Support for simultaneous IPv4 and IPv6 addresses, both for management and data ports.
- Management (GUI/SNMP) using IPv6 address
- IP inputs using IPv6 addresses
- IP output using IPv6 addresses

4.1.2.1 Management GUI

IPv6 addresses are supported in the GUI where IP addresses are set on interfaces, eg Control and Data ports, PSI Syncornisation and Twin MMI settings.



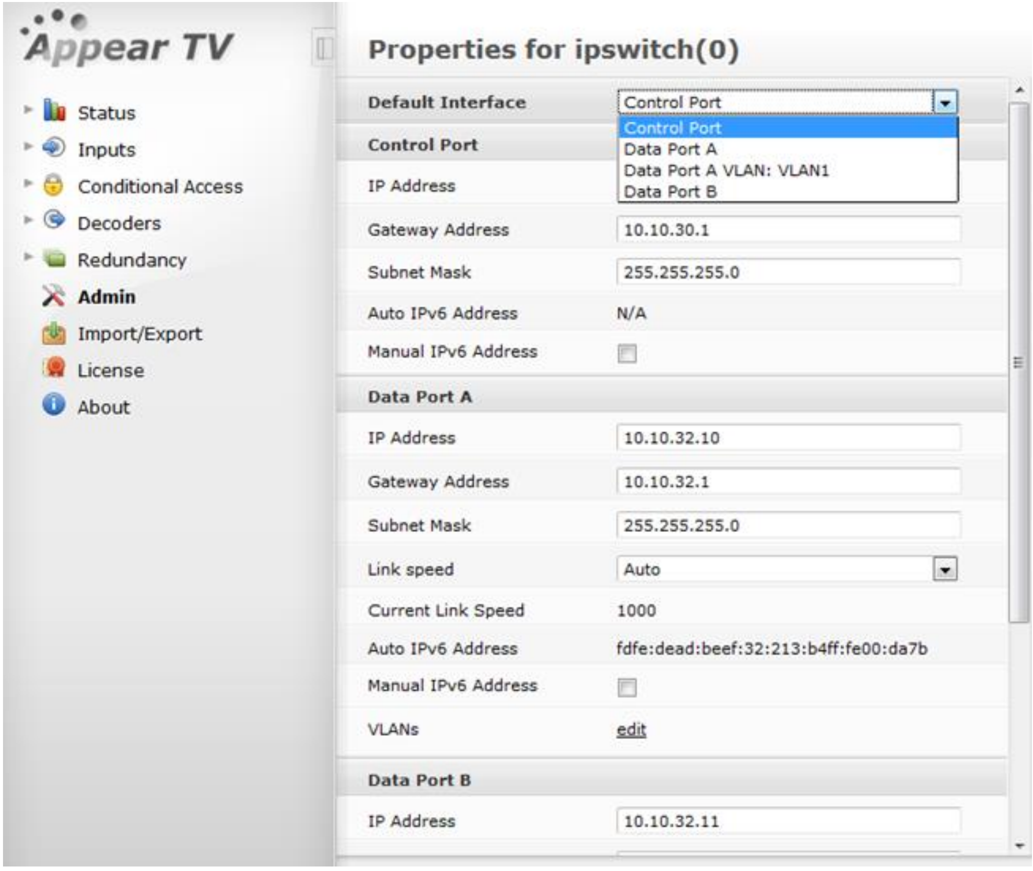
Default interface	Default interface for Management interface. This can be selected between control and dataports, as well as any configured VLANs.
Auto IPv6 Address	All interfaces will automatically get an IPv6 address which is generated based on router advertisements. The address will have a correct prefix, and be unique on the connected network.
Manual IPv6 Address	When enabling Manual IPv6 Address, the port can be configured with a manual IPv6 Address. Prefix length and Gateway address is also set.
IPv6 NTP server	The unit can connect to an IPv6 NTP server by inserting a valid IPv6 address in the "NTP server" field.
Internal Redundancy	The twin MMI card can use an IPv4 or IPv6 address.
PSI Synchronization	The PSI Synchronization units can use an IPv4 or IPv6 address

4.1.3 Management over IP-Data Port and VLANs

In the Admin section of the MMI card, it is now possible to set the default interface for the Management interface. This includes the GUI, Maintenance Center and SOAP operations.

This will allow you to configure the IP dataports on the switch card, or a configured VLAN for the default management interface.

After configuring VLANs we can see it in the drop down list in the control port refer below figure.



4.1.4 Broadcast Firewall

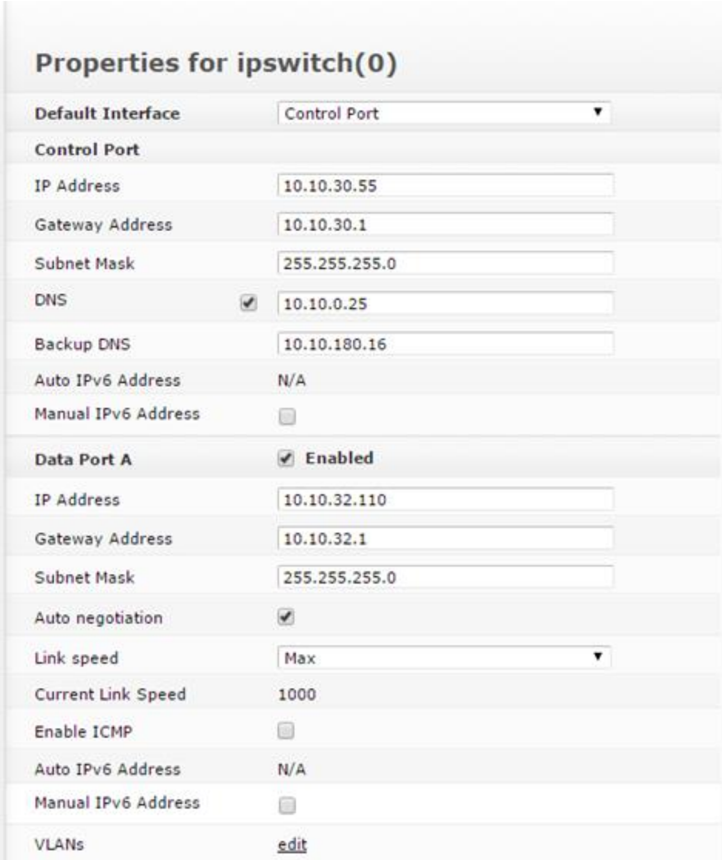
Each IP Dataport is by default configured with IP Firewall features. This has the following configuration in terms of ports:

- **Secure** (Default)
  - ARP open by default
  - ICMP (ping) - by default closed, but able to be opened
  - IGMP -enabled on the IP input card
  - OSPF - enabled for output ports when OSPF is selected for Output Redundancy
  - PIM - enabled for output ports when the PIM is enabled for Output Redundancy
  - UDP Filter –Any UDP traffic that is not a configured multicast is blocked

- **Public** (Enabled when data-port is set as MMI port in the Admin Page)
  - All protocols open

4.1.5 DNS Configuration

For the Control port interface, it is possible to configure a main/backup DNS server. This is not required for general operation of the unit.



To enter DNS addresses, enable the checkbox and enter at minimum a main DNS IP address. The backup DNS is not required, but can be entered if required.

If there is no contact with either of the configured DNS IP addresses an alarm will be raised.

4.1.6 Internal Time Clock Setting / Network Time Protocol (NTP) Server

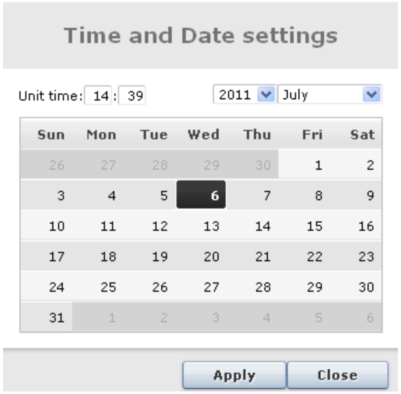
The unit internal time may be configured manually, or it may be configured with a Network Time Protocol (NTP) server to set and update the system's date and time.

Open the Admin view in the **Navigation Pane** and select the module hosting the Man Machine Interface (MMI).

To configure the NTP Server settings, enter the following data below:

IP Address	IP address of the NTP server
Local Timezone	Your local timezone

To set the internal time manually, simply click on **Edit time & date** to produce the dialog below.



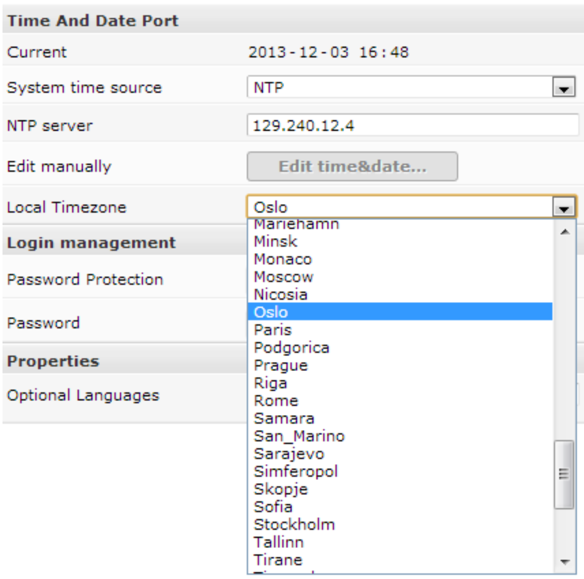
Set the date and time accordingly.

Once the internal time has been configured, it will be displayed in the **Current Time** field, under the **Time and Date** section.

4.1.7 Automatic Daylight Saving

The Time Zone can also be selected on the Admin page for automatic updates of daylight savings for the system time.

If you required the Time Zone file for a given region, please contact support@appeartv.com. This file can be installed from the Maintenance Center, by selecting and uploading to the MMI slot.

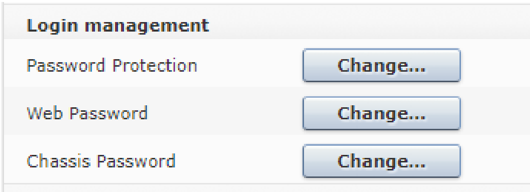


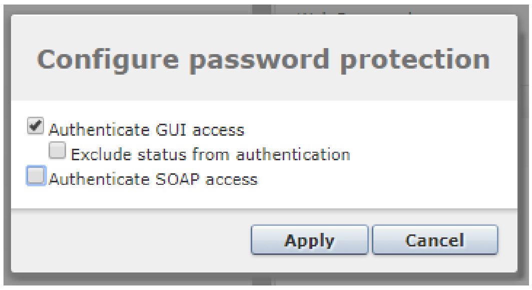
4.1.8 Login Management

4.1.8.1 Password Protection in the GUI

For enhanced security the Web interface supports password protected access. This feature is disabled by default but may be enabled easily from the GUI.

To authenticate GUI access, in the MMI **Admin** view, click **Change** under the **Password Protection** entry in **Login Management**. Check the appropriate checkbox and click **Apply**. Reboot the MMI module for this change to take effect.





The *Exclude status from authentication* option is provided in cases where only certain parts of the GUI need to be protected. If this checkbox is checked, only the **Service View**, **Hardware View** and **Active Alarm View** will be excluded from authentication. All other pages, including **Alarm History** will require authentication to be viewed.

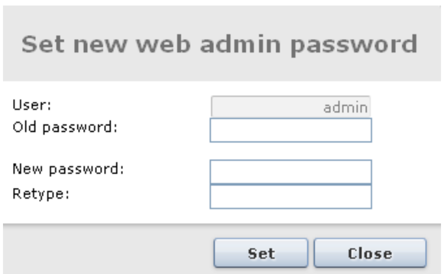
The 'Authenticate SOAP access' will enable authentication on the SOAP API access. This will be valid for both HTTP and HTTPS mode. This uses the same web GUI password for authentication. For more details on the authentication API, please contact Appear TV.

4.1.8.2 Changing the Password for the GUI

The secure login supports one pre-defined user account – the admin user. The password protects the web GUI only, i.e., the SOAP interface is not password protected.

User	admin
Default password	admin

To change the password click **Change**. The following dialog will appear:



Type in the new password and click Set. Finally, click **Close** to exit the dialog. Reboot the MMI module for the new password to take effect.

4.1.8.3 Changing the password for chassis/CLI access

This option allows you to change the password for the 'asio' user on the SSH/CLI interface. This option is only available for units running in HTTPS mode.

For details on the default password, please contact Appear TV.

4.1.9 Optional Languages

It is possible to specify one or two default languages which will always be available when configuring decoder modules. Since the drop-down list of available languages only includes languages currently present in the transport stream, this enables the operator to select languages expected to be present in the transport stream at a later point in time.

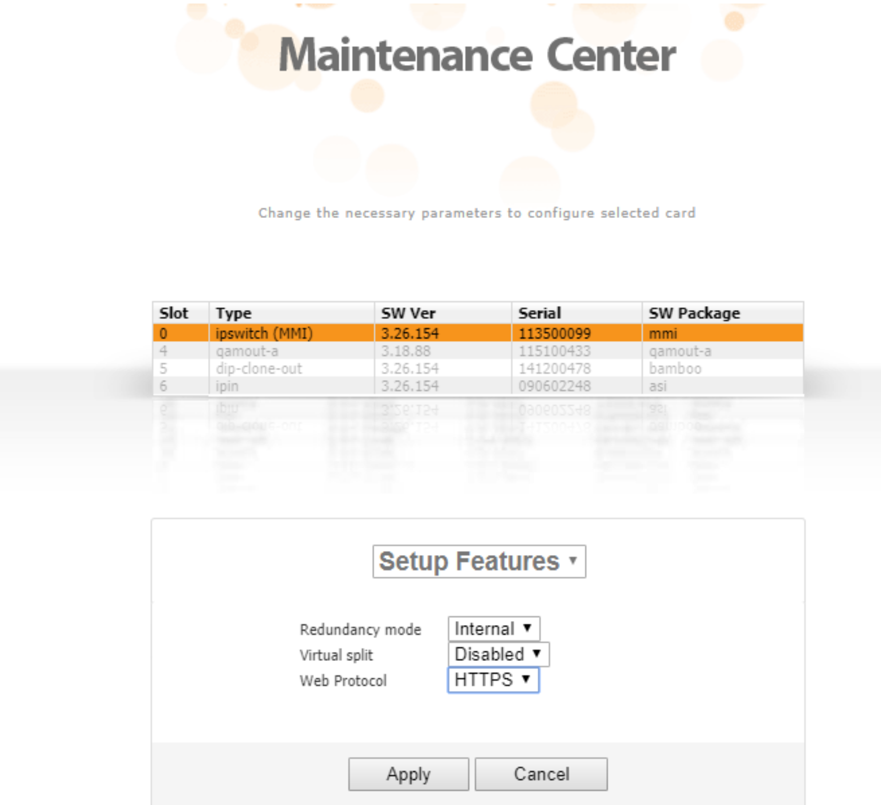
Open the Admin view in the **Navigation Pane** and select the module hosting the MMI.

Enter up to two additional languages for the Optional Languages field. Language codes should be separated by a comma, e.g., *nor,dan*.

Language codes are defined in the ISO 639 specification.

4.2 Support for HTTPS in Maintenance center

It is possible to enable HTTPS in the Mintenance Center. On the MMI select 'Setup' and in the dropdown select 'Setup Features'. Under 'Web Protocol' specify HTTPS. After clicking 'Apply' the message "Webserver has been restarted" should be displayed and unit will be accessible with https ://(ip address) of the chassis.



4.3 Configuration of Clock reference module

Please refer to the Terrestrial Solution Configuration Guide for more information on this module and its configuration.

4.4 Licensing

Licenses for modules in the unit are hosted by individual cards. Hence, the available features will not be determined before the cards are registered or logged into the MMI board. The table below lists all available licenses:

Module	License	Description
adm	hd-decoding	Enables decoding in HD.
	Dolby Digital Plus	Enables decoding of Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3)
	osdm	Enables the On Screen Display option for the decoded output.
	stereo	Enables the A2/NICAM output and sound options for RF output modules.
audiolevel	number-of-audio-pids	Enables the number of audio PIDs with audio leveling.
bulkdscr	number-of-descrambled-services	Enables the number of services for bulk descrambling.
	verimatrix	Enables communication with the Verimatrix CA system
	latens	Enables commnunication with Latens system
descrambler-ci-gen	number-of-descrambled-services-cam-a	Enables the number of maximum possible descrambled service on CAM-A
	number-of-descrambled-services-cam-b	Enables the number of maximum possible descrambled service on CAM-B
cofdmout-cable	modulation-cofdm	Enables COFDM modulation for the output.
	num-ts	Enables the number of maximum possible output multiplexes.
dvbs2	dvbs2	Enables the DVB-S2 demodulation options
	dvbs2-input-multistream	Enables Multistream reception option for the DVB-S2 module
	number-of-t2plp-extractions	Enables the de-encapsulation of a total of 64 PLPs from up to 64 T2MI input streams per input card
epg	epg	Enables EPG.
asiout	mip-inserter	Enables MIP on the ASI output port.
dip-cloned-out	mip-inserter	Enables MIP on the dip-cloned output card.
asi-in	number-of-t2plp-	Enables the de-encapsulation of a total of 64 PLPs from up to 64 T2MI input streams per

Module	License	Description
	extractions	input card
switch/ipin	ipin-pro-mpeg-fec	Enables the reception of IP FEC streams on supported hardware
	seamless-ip-in	Enables IP input seamless switching
	ts-insertion	Enables TS insertion option
dip-in (dip-t2mi-decap)	number-of-t2plp-extractions	Enables the de-encapsulation of a total of 64 PLPs from up to 64 T2MI input streams per input card
switch/ipout	ip-out-mpts	MPTS refers to Multiple Program Transport Stream. Without the ip-out-mpts license, only SPTS (Single Program Transport Stream) is available.
	ip-pro-mpeg-fec	Enables IP Forward Error Correction (FEC) option supported hardware
	output-redundancy	Enables output redundancy for the module.
	data-mapping	Enables support for transparently mapped EDI/data streams
	pmt-switcher	Enables pmt switching feature on output card
qamout-a	modulation-qam	Enables QAM modulation for the output.
	num-ts	Enables the number of maximum possible output multiplexes.
dab	modulation-dab	Enables DAB modulation for the output.
	num-ts	Enables the number of maximum possible output multiplexes.
dvb-t2	dvbt2-input	Enables the DVB-T2 demodulation options.
srt	srt-input	Enables srtSRT input
srt	Srt- output	Enables srtSRT output options.
isdbtout-cable	modulation-cofdm	Enables COFDM modulation for the output.
	num-ts	Enables the number of maximum possible output multiplexes.
dvbs-if dvbs-lband	modulation-dvbs2	Enables DVB-S2 modulation for the output.
	num-ts	Enables the number of maximum possible output multiplexes.
	precorrection	Enables precorrection on output stream
dvbs2x-in	dvbs2	Enables the DVB-S2 demodulation options
	dvbs2-input-multistream	Enables Multistream reception option for the DVB-S2 module
	dvbs2x-input	Enables the DVB-S2X input
	dvbs2-input-blindscan	Enables blindscan option
	number-of-t2plp-extractions	Enables the de-encapsulation of a total of 64 PLPs from up to 64 T2MI input streams per input card
dvbs2x-out	carrier-id	Enables Carrier ID option

Module	License	Description
	modulation-dvbs2	Enables DVB-S2 modulation for the output.
	modulation-dvbs2x-bc	Enables S2X MODCODS up to and including 64-APSK ,all roll-offs and normal FEC size
	modulation-dvbs2x-pro	Enables S2X MODCODS up to and including 64-APSK,all roll-offs and short FEC size
	num-ts	Enables the number of maximum possible output multiplexes.
	precorrection	Enables precorrection on output stream
	s2x-10mhz-ref	Enables embedded 10MHz output option
encoder	number-of-hd-encoders	Enables the number of HD services to be encoded.
	number-of-sd-encoders	Enables the number of SD services to be encoded.
	number-of-statmux-channels	Number of channels with Statistical multiplexing enabled
transcoder	number-of-hd-encoders	Enables the number of HD services to be transcoded.
	number-of-sd-encoders	Enables the number of SD services to be transcoded.
	number-of-statmux-channels	Number of channels with Statistical multiplexing enabled
transcoder-ms	Dolby Digital Plus Professional Decoder	Enables decoding of Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3)
transcoder-bc	num-cfg-blocks	Number of blocks available for transcoder-bc
	mpeg2	Enables mpeg2 transcoding
	h264	Enables H264 transcoding
	dense-sd	Enables 4xSD per half mode (16-SD) services to be transcoded
	Dolby Digital Plus Professional Decoder	Enables decoding of Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) inputs
universal-encoder-ms	video-mode-ms	Enables Encoder to be in multiscreen mode.
universal-encoder-bc universal-encoder-bc-hvq	video-mode-bc-hvq	Enables Encoder to be in high video quality mode
	video-mode-bc-hvq	Enables Encoder to be in high video quality mode
	number-of-hd-encoders	Enables the number of HD services to be encoding.
	number-of-sd-encoders	Enables the number of SD services to be encoding.
	number-of-statmux-channels	Number of channels with Statistical multiplexing enabled
	number-of-mpeg1-and-aac-stereo-encoders	Enables the number of MPEG1L2 or AAC Audio stereo encodings
	Dolby Digital Plus Professional Encoder	Enables the Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) Encoding for a number of stereo pairs.

Module	License	Description
	(#stereo pairs)	Please note, Dolby 5.1 requires 3 stereo pairs, Dolby 7.1 requires 4 stereo pairs
	number-of-auto-loudness-adjustment-instances	Enables Automatic Loudness adjustments feature on audio Supports up to 24 stereos in total
	subt-transcode	Enables conversion of EBU teletext to DVB teletext
	subt-import-encode	Enables Import subtitles license (PTS restamp)
universal-transcoder-bc	video-mode-bc	Enables Transcoder to be in broadcast mode
	mpeg2	Enables mpeg2 transcoding
	h264	Enables H264 transcoding
	dense-sd	Enables 4xSD per half mode (16-SD) services to be transcoded
	subt-transcode	Enables conversion of EBU teletext to DVB teletext
	number-of-statmux-channels	Number of channels with Statistical multiplexing enabled
	number-of-mpeg1-and-aac-stereo-encoders	Enables the number of MPEG1L2 or AAC Audio stereo encodings
	Dolby Digital Plus Professional Encoder (#stereo pairs)	Enables the Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) Encoding for a number of stereo pairs. Please note, encoding 5.1 requires 3 stereo pairs, 7.1 requires 4 stereo pairs.
	Dolby Digital Plus Professional Decoder (#stereo pairs)	Enables the Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) Decoding for a number of stereo pairs. Please note, decoding discrete 5.1 requires 3 stereo pairs, discrete 7.1 requires 4 stereo pairs. Only 1 stereo pair needed if only a 2.0 downmix of the multi-channel input is desired.
	number-of-auto-loudness-adjustment-instances	Enables Automatic Loudness adjustments feature on audio Supports up to 24 stereos in total
universal-transcoder-bc-hvq	video-mode-bc-hvq	Enables Transcoder to be in high video quality mode
	decode-10bit-422	Enables AVC High10,High 422 and 8bit 422 Decode per module
	number-of-hd-encoders	Enables the number of HD services to be encoded
	number-of-sd-encoders	Enables the number of SD services to be encoded
	subt-transcode	Enables conversion of EBU teletext to DVB teletext
	number-of-statmux-channels	Number of channels with Statistical multiplexing enabled
	number-of-mpeg1-and-aac-stereo-encoders	Enables the MPEG1L2 or AAC Encoding for a number of stereo pairs. Please note, encoding 5.1 requires 3 stereo pairs.
	Dolby Digital Plus Professional Encoder (#stereo pairs)	Enables the Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) Encoding for a number of stereo pairs. Please note, encoding 5.1 requires 3 stereo pairs, 7.1 requires 4 stereo pairs.

Module	License	Description
	Dolby Digital Plus Professional Decoder (#stereo pairs)	Enables the Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) Decoding for a number of stereo pairs. Please note, decoding discrete 5.1 requires 3 stereo pairs, discrete 7.1 requires 4 stereo pairs. Only 1 stereo pair needed if only a 2.0 downmix of the multi-channel input is desired.
	Dolby E Decoder (#stereo pairs)	Enables the Dolby E Decoding for a number of stereo pairs. Please note, decoding discrete 5.1 requires 3 stereo pairs, discrete 7.1 requires 4 stereo pairs. Only 1 stereo pair needed if only a 2.0 downmix of the multi-channel input is desired.
	number-of-auto-loudness-adjustment-instances	Enables Automatic Loudness adjustments feature on audio Supports up to 24 stereos in total
universal-transcoder-ms	video-mode-ms	Enables Transcoder to be in multiscreen mode
	number-of-mpeg1-and-aac-stereo-encoders	Enables the MPEG1L2 or AAC Encoding for a number of stereo pairs.
	Dolby Digital Plus Professional Decoder	Enables the Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) Decoding for a number of stereo pairs.
audio-encoder/transcoder	number-of-mp3-stereo-encoders	Enables the MPEG1L3 Encoding for a number of stereo pairs.
	number-of-mpeg1-and-aac-stereo-encoders	Enables the MPEG1L2 or AAC Encoding for a number of stereo pairs.
	number-of-auto-loudness-adjustment-instances	Enables Automatic Loudness adjustments feature on audio Supports up to 32 stereos in total
scrambler	number-of-scrambled-services	Enables the number of services to be scrambled and the corresponding encryption algorithm.
	aes-cbc-irdeto	Vendor specific scrambling license.
	pvr-pes-clear	Enables PVR PES Clear mode for the scrambler and ensures that the pes headers are not scrambled.
	rai-pvr-mode	Enabled Conax PVR Assist (RAI) mode
tvmod	modulation-analog	Enables PAL or Secam modulation for the output.
	num-channels	Enables 4 or 8 channels to be output.
cabletv-in	dvbc-input	Enables 16 channels to be input
	J83b-input	Enables j83b standard

If a licensed feature is used without the correct license installed, the system will produce a **License Violation** warning. Use the **License** node to find which licenses are acquired and available.

4.4.1 Ordering a License File

Use the License node to order a license file. Flag the required licenses using the check boxes. The **Order License** button will produce a license order file which should be sent to the vendor. A matching license file will then be returned.

4.4.2 Installing a License File

A valid license file may contain licenses for one or several cards. This means that one license file may be used for several units. The installation process will scan the file and if a matching serial number is found the license will be installed on the respective card within the unit. The license file is signed; if edited, it will be invalid.

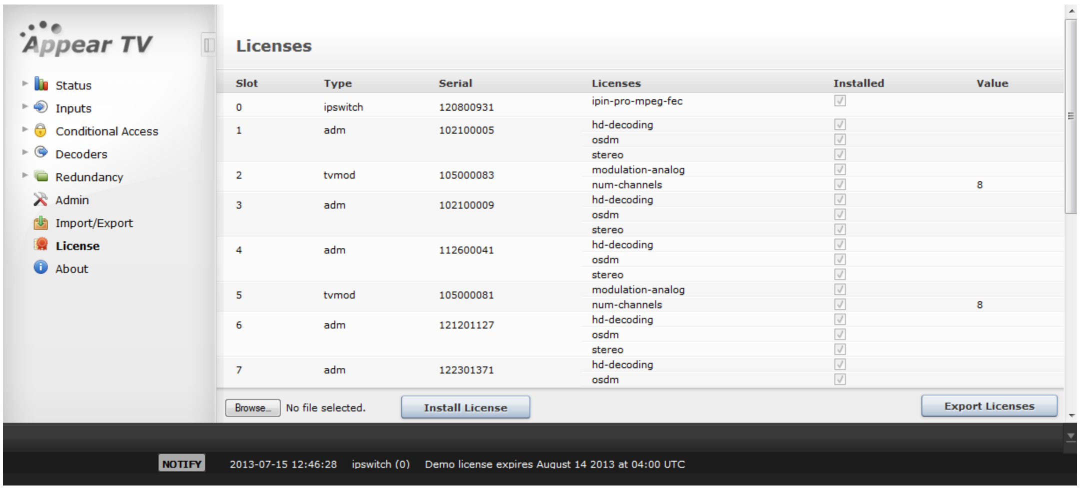
Usually, the license file will be sent in a ZIP file and can be loaded directly to the GUI.

Once a license file is available from a machine with access to the web GUI, select the file and click **Install License**. If no warnings are displayed, the additional privileges should now be available.

4.4.3 Demo Licenses

When required, a time limited demo license can be provided in order to evaluate licensed features. The procedure to load a demo license is the same as a purchased license.

Once installed, the GUI will notify the user by creating an alarm about the presence of the demo license and what date it expires. When the demo license expires, then the card will be rebooted at 4 AM UTC time. After the card has rebooted, the demo license is no longer present on the card.

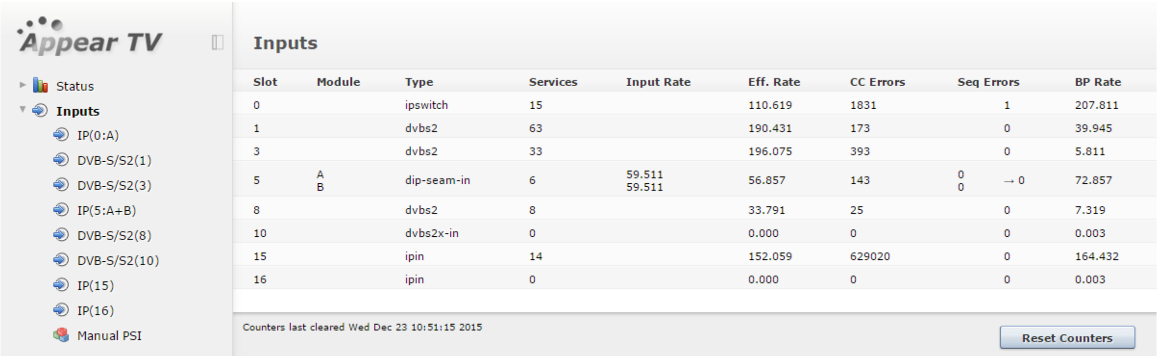


5 Input Configuration

This chapter describes the **Inputs** node in the GUI and how to analyze the available inputs.

5.1 The Inputs Node

The unit can be configured to host a number of different input modules. Open the Inputs node from the **Navigation Pane** to view all available input modules



The following information is available in the **Inputs** node:

Slot	Slot position in the chassis
Type	Type of input module
Services	Number of services present in the transport stream
Input Rate	Seamless IP Input only. Total input rate per port
Eff.Rate	Effective bandwidth of the incoming transport stream
CC Errors	Number of Continuity Counter (CC) errors detected on all input ports since last reset; CC errors indicate that one or more packets are lost.
Seq Errors	Number of Transport Stream errors detected on all input ports. Errors indicate problems with the incoming TS structure of the streams
BP Rate	Rate of active services transmitted to the backplane

Each input module available in the unit has some common analysis features; they all support manual definition of input PSI. The coming sections will describe these common features followed by details on how each input module can be configured.

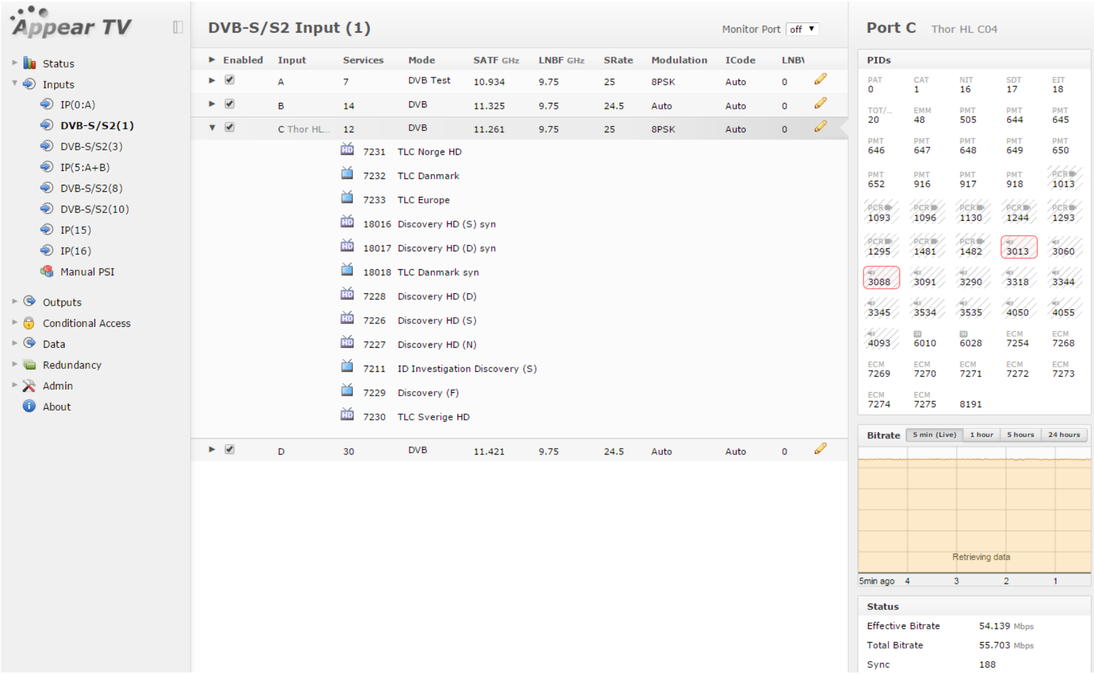
5.2 Input Analysis

For each input module, the unit provides detailed MPEG/DVB/ATSC transport stream analysis for all available input streams. The following information is provided by the input analysis engine:

- Port specific status
- PSI/SI analysis of all input services

- PID display – listing all input PIDs for each input, with implicit highlighting of CC errors, PCR flag and scrambling bits (odd/even)

This information is accessible by expanding the **Inputs** view in the **Navigation Pane**. The following example is based on a DVB-S/S2 input module, but the same applies to all input modules.



5.2.1 Input Port Analysis

Within the **Inputs** node, it is possible to access lower level information, e.g. port specific information. To obtain port specific information select the required input port and check the status parameters in the right hand status pane.

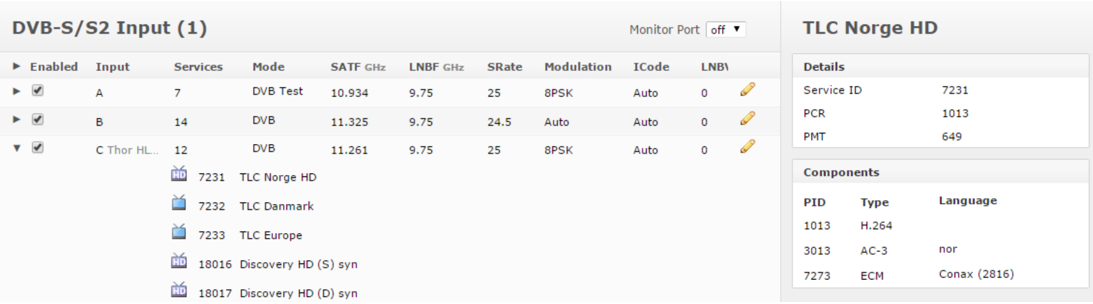
Status	
Effective Bitrate	54.094 Mbps
Total Bitrate	55.703 Mbps
Sync	188
Input Power	-63.15 dBm
EbNo	11.378581 dB/Hz
BER	< 1.00e-09
CNR	14.857974 dB
Carrier Offset	-1.011 Mhz
Actual Frequency	11.260 GHz
Actual Symbolrate	25.000 Mbaud
Actual Modulation	ldpc_8psk_3/4
Lock Status	Locked
Link Margin	6.718581 dB

For more details on actual parameters, refer to the configuration section for the respective input type in this chapter.

5.2.2 Input Service Analysis

Once an input Port is selected and expanded, all signaled services on this port are displayed in the expanded port. An icon used the represent the service will be displayed if signaled in the incoming SDT table.

Clicking on one of the listed services will display more detailed information about the different PIDs like PMT, PCR, video, audio, etc.

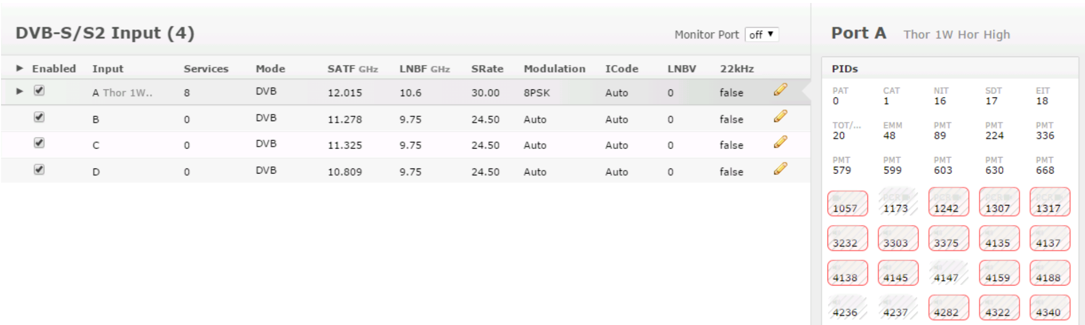


The Audio language descriptor is decoded. In the figure above, the audio is listed as *nor*, ie Norwegian. However, if no language descriptor is present the unit will auto-generate a descriptor for internal usage and they will be named A01, A02, etc.

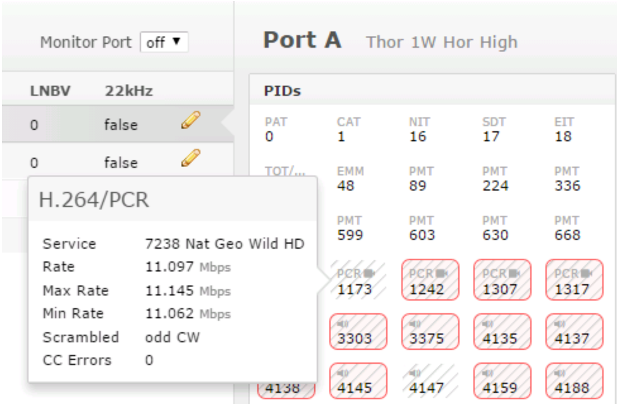
	Details of the PSI/SI analysis are not 100% DVB compliant, but it does include the most commonly used tables and descriptors.

5.2.3 Input PID Analysis

When selecting an input port, the right-hand status panel will list all PIDs detected for a given port.

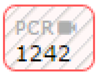


If the PID type is known, then this is shown above the PID, eg PAT, PMT and Video with PCR. For details of each PID, you can hover your mouse cursor over the PID.



The status of each PID is also presented by highlighting:

- Scrambled PIDs are represented by a grey strikethrough 

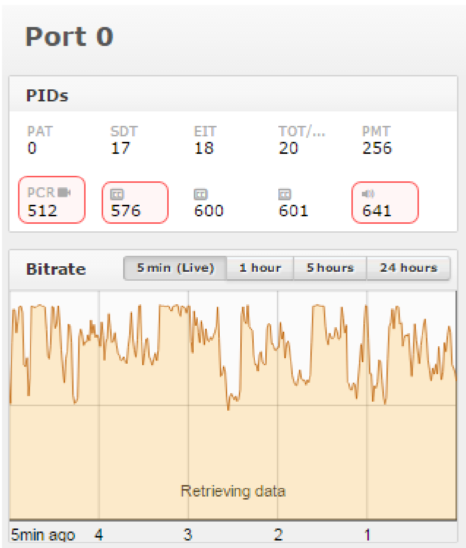
- PIDs with a CC error are represented with a rex box 

It is possible to reset the CC error counters. This reset is a global operation for all inputs and is done with the Reset CC button in the **Inputs** node.

5.2.4 Port Bitrate Status

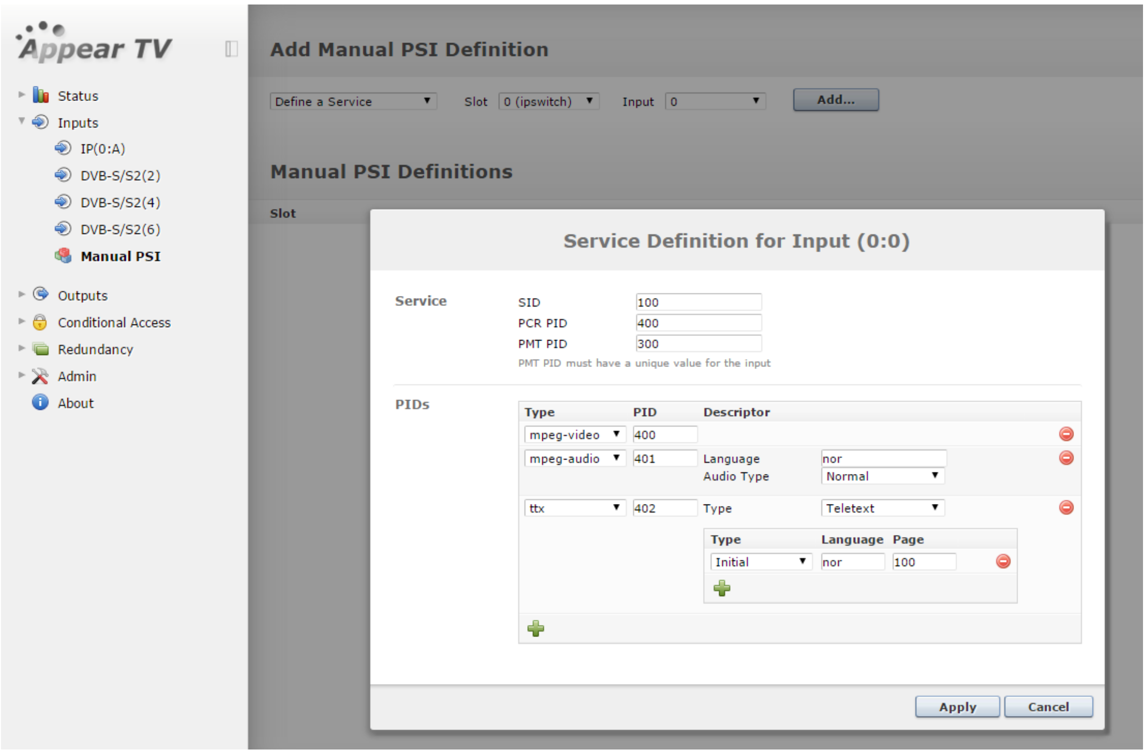
The input effective bitrate can be monitored per port and this is available in the right-hand status pane when clicking on an input port. Bitrate can be monitored for the port in time intervals of

- 5 mins(live)
- 1 hour
- 5 hours
- 24 hours



5.3 Manual PSI

In case the input PSI information is not available, a predefinition of the PSI may be necessary in order to configure a service that is occasionally available. This could be used, for instance, to predefine some services for dynamic VOD usage or to signal a STB upgrade PID.



5.3.1 Defining a Service (PMT)

In the **Manual PSI** node, select **Define Service** from the pull down menu and enter the appropriate slot and port values matching the incoming stream. Once, the 'Add' button is clicked the following information is displayed:

Service Id	Service ID for the manual service
PCR PID	PCR PID for the manual service
PMT PID	PMT PID for the manual service
Type	You can here add multiple components and select one of the following component types: • Video (MPEG-2) • H264 • Audio (MPEG-2 audio) • AAC • AC-3 • Private Sections • PES Private • Manual
PID	PID number for the component
Properties	Additional information for the component, if necessary.

	The PMT PID may be defined with any value from 32 to 8190, but ensure that it is unique in an MPTS configuration scenario. Also, if this input is part of an outgoing digital stream, the PMT PID here is the PID value that will be assigned for the outgoing PMT.

When an input service is defined, the following tables are generated:

- PAT
- PMT

All other table analysis is cancelled for this input port.

This entry may be edited or deleted later using the corresponding icons on the left.

5.3.2 MPTS Support

If multiple services are defined for one input port, they effectively represent a MPTS.

To check that the manually defined input has entered the system correctly, select the **Inputs** node and ensure that the service information is present.

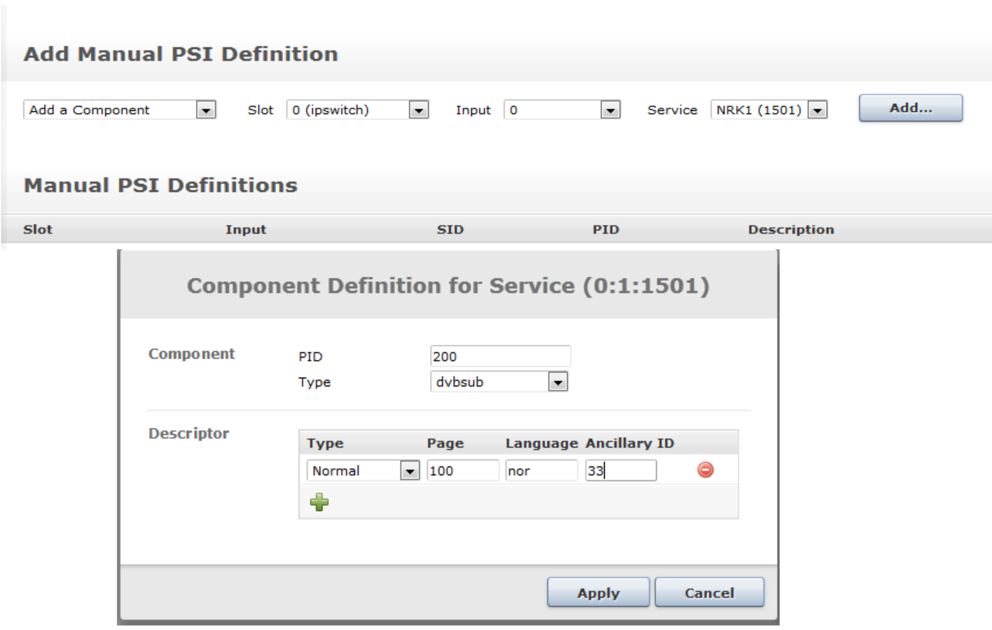
	If manual PSI is defined for an input port, all incoming services must be defined. It is **not** possible to define only **one** service manually and use the incoming PSI to represent the rest.

5.3.3 Adding a component for an incoming PID

If there is an un-signalled on the input port, it is possible to add this to be signalled to an existing input service.

To define the PSI for an incoming PID

1) Select the input reference from the Input->PSI navigation Page.
2) Press the Add button and insert the appropriate information.



Component PID	Enter the PID value of the incoming PID to which the signaling shall be defined.
Component Type	Specify the type of component.
Descriptor Type	Depending on the type of components different descriptor options will emerge.

5.3.4 Changing the language descriptor of an incoming audio

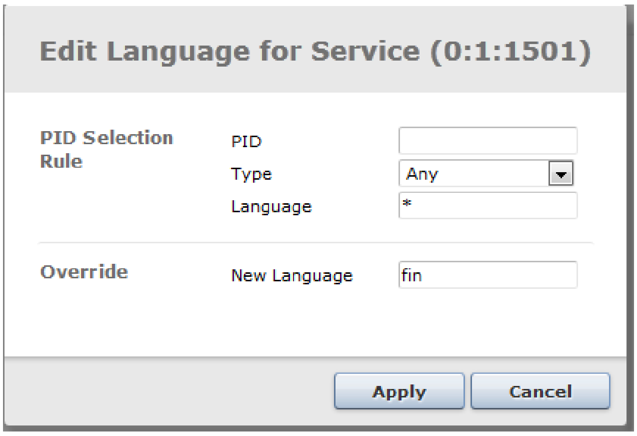


Figure 5.14 – Edit Language descriptor

PID	The input PID to update.
Type	The audio type where the language descriptor shall be replaced. • Any • mpeg-audio • ac-3 • aac_latm • aac_adts • e-ac3-e
Language	The language signaled on the input. If this is not a filtering criteria then use wildcard "*"
Override	The new language descriptor to be used for the incoming component.

Note

- If several PIDs are matching the input filtering criteria's, then the signaling for all these components will be updated.
- If the input signaling is dual mono, and no Language (source) is specified, then the right channel descriptor will be replaced.

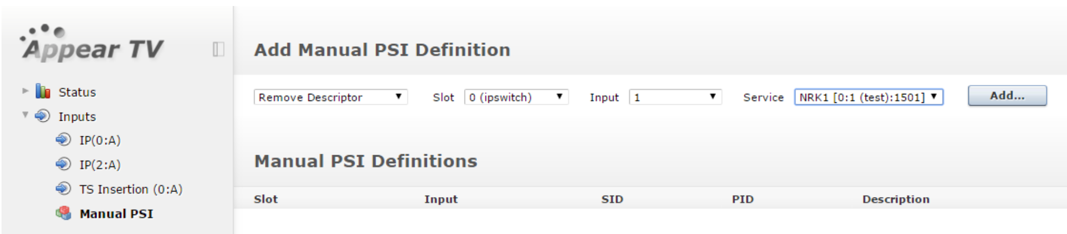
5.3.5 Edit options on existing manual PSI

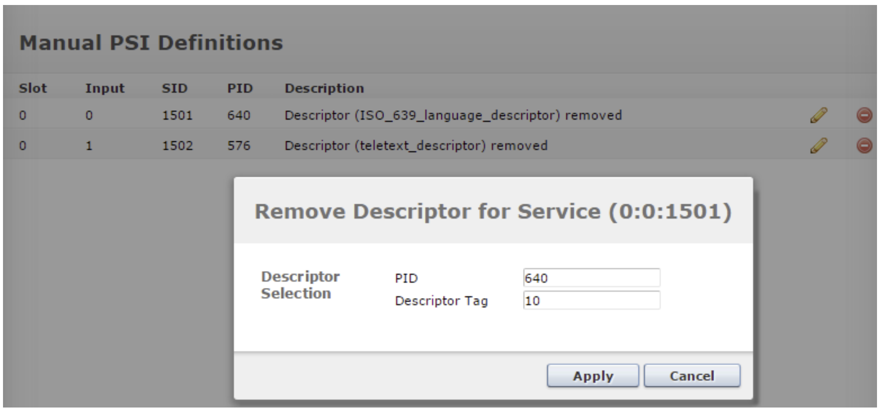
Under the Manual-PSI node all current manual PSI rules will be listed. Not all rules can be changed once they are defined. These are indicated with a blue circle with the "?" mark. To change these components they need to be removed and re-added. The rules indicated with a pencil can be changed without remove / add operation.

5.3.6 Remove descriptor

With the Remove Descriptor option, it is possible to remove signalling of a descriptor in the PMT for a given PID/tag.

In order to configure this, first select the 'Remove Descriptor' option and then select the Slot, Input Port and Service. Once you click 'Add' you will be provided with a dialog in which you can specify the PID (specified in the PMT) and the descriptor tag that should be removed (integer value).





5.4 Input Modules

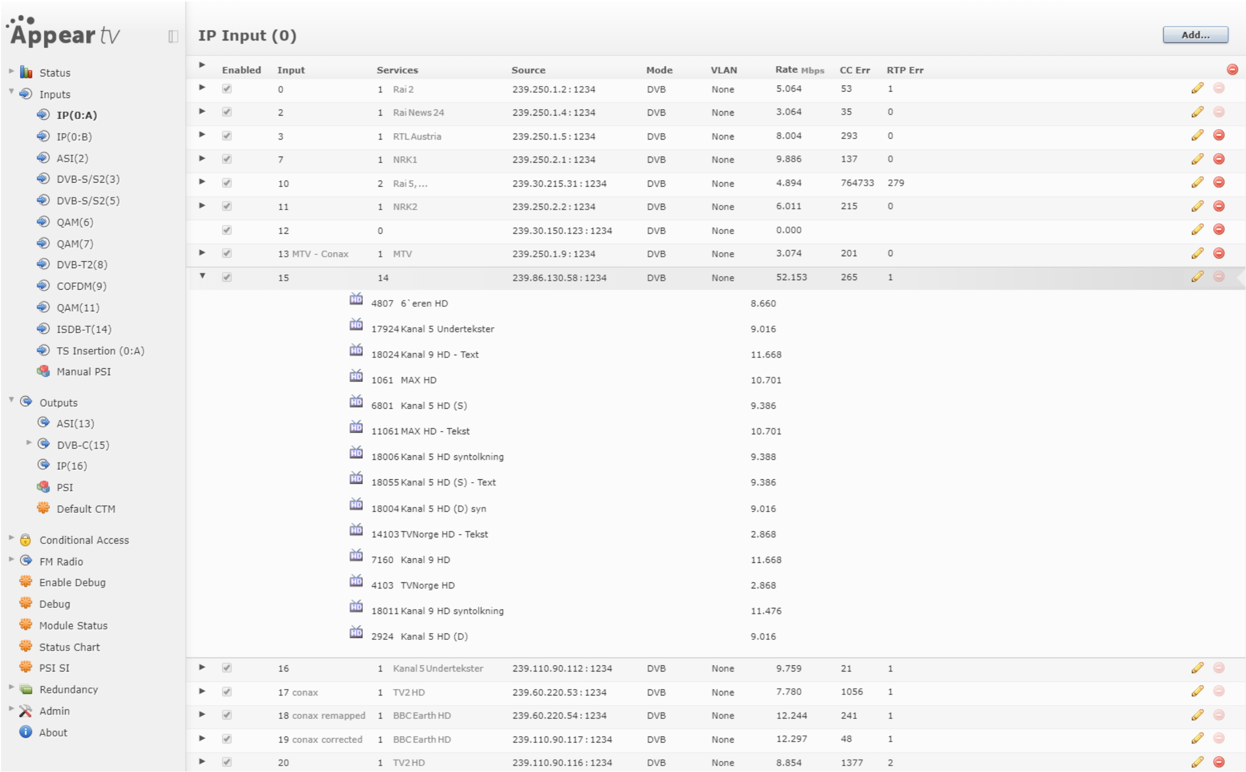
5.4.1 IP Input

There are two different types of modules supporting IP input, the switch with IP module and the standalone IP module (with and without FEC option). The following description is valid for all.

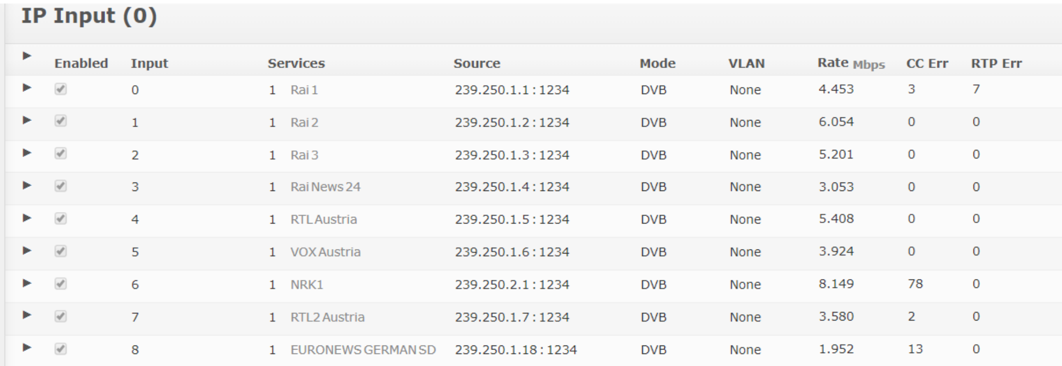
The input streams can be either SPTS (VBR or CBR mode) or MPTS. To configure the module:

- Switch to the **Inputs** node in the **Navigation Pane**

- Select the IP input module you want to configure and the module configuration window will be displayed.



- The column width is designed in such a way that it accommodates longer names


IP Input (0)

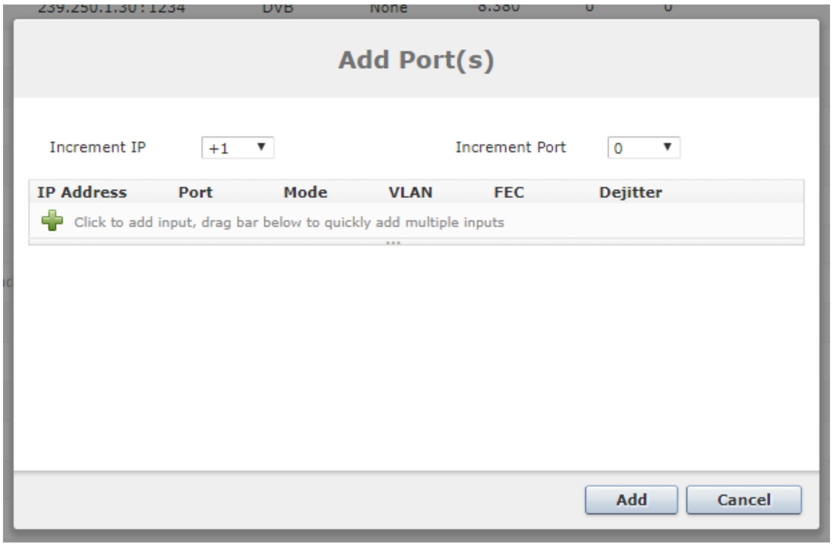
Enabled	Input		Services	Source	Mode	VLAN	Rate Mbps	CC Err	RTP Err
✓	0	1	Rai 1	239.250.1.1 : 1234	DVB	None	4.453	3	7
✓	1	1	Rai 2	239.250.1.2 : 1234	DVB	None	6.054	0	0
✓	2	1	Rai 3	239.250.1.3 : 1234	DVB	None	5.201	0	0
✓	3	1	Rai News 24	239.250.1.4 : 1234	DVB	None	3.053	0	0
✓	4	1	RTL Austria	239.250.1.5 : 1234	DVB	None	5.408	0	0
✓	5	1	VOX Austria	239.250.1.6 : 1234	DVB	None	3.924	0	0
✓	6	1	NRK1	239.250.2.1 : 1234	DVB	None	8.149	78	0
✓	7	1	RTL2 Austria	239.250.1.7 : 1234	DVB	None	3.580	2	0
✓	8	1	EURONEWS GERMAN SD	239.250.1.18 : 1234	DVB	None	1.952	13	0

The following status is displayed for each input port:

Enabled	Display purposes only
Input	Input port number
Services	Number of services on the input port
Source	IP address and port of the multicast or unicast
Mode	The analysis mode of the input stream.
VLAN	Name of VLAN (if enabled)
Rate	Incoming data rate

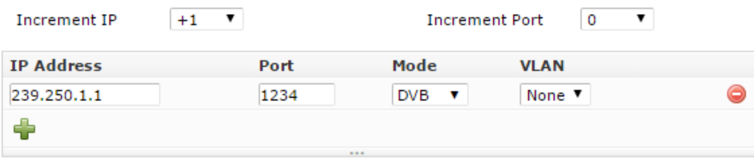
CC Err	Continuity Counter Error – indicates that one or more packets are lost
RTP Err	Real-time Protocol Error – represents the number of discontinuities on the RTP counter if RTP is enabled on source. If RTP is not enabled on the source, **N/A** is displayed.

To add new input streams to the IP Input, first click the **Add** button in the top right corner. You will then be presented with the following dialog box:

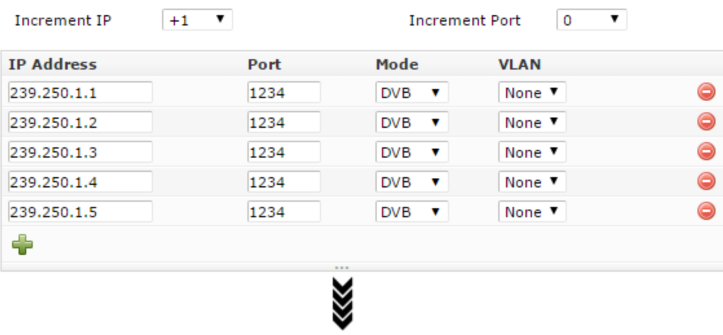


Once the + button is clicked you will be presented with an initial field with the following parameters available:

When adding an IP input, the following parameters are available:

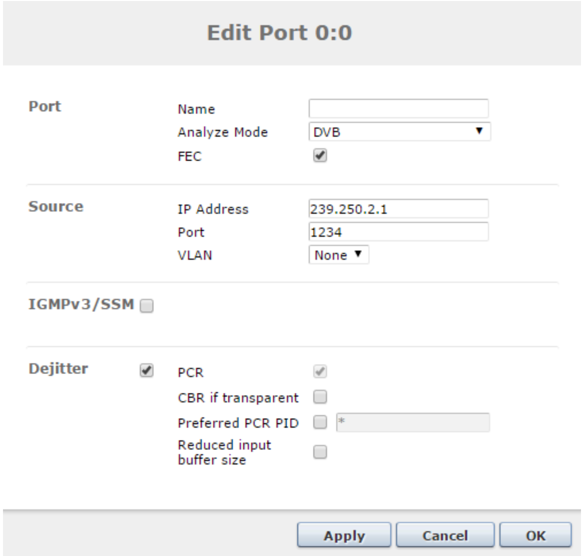


Extending the dialog box down will add more multicasts based on the 'Increment' settings:



Settings here can be adjusted per input stream and once complete click the '**Add**' to apply.

Once a list of input streams are added, you can edit each input. The following parameters are available:



The following additional parameters are available for configuration:

Name
This name is displayed as a tooltip when the mouse cursor hovers over the port.

Analyse Mode
Select one of the following modes:

- DVB
- DVB (SDT)
- MPEG
- ATSC

OFF

FEC
Enable if input stream has IP FEC present

IP Address
IP address of the multicast or unicast

Port
UDP Port of the multicast or unicast

VLAN
Name of VLAN (if enabled)

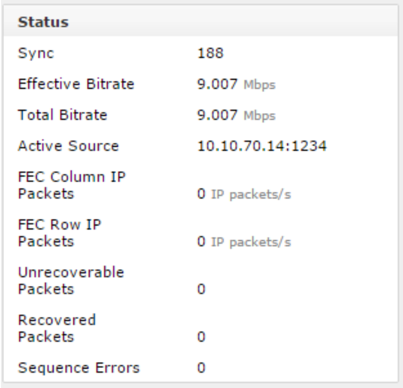
IGMPv3/SSM
Enable or disable IGMPv3/SSM on the port, Please see **Error! Reference source not found.** for more information and options

Dejitter
If input de-jittering is enabled, the following options are displayed:

- PCR. This is automatic for regular streams
- Preferred PCR PID. This allows you to set a PCR PID in the input multiplex as a priority to use for de-jittering. If this PID is not available, then the next valid detected PCR will be used. This is only valid for transparently mapped streams.
- CBR (if transparent). This de-jitter mechanism will use the incoming CBR total bitrate as a guide for the clock source of the stream. This is only valid for transparent mapped and PID imported outputs.
  This feature is only available on the Switch+IP module.

Reduced Input Buffer
Enable or disable Reduced Input Buffer for introducing a low latency IP dejitter function on the Switch+IP and Dual IP modules.

The status parameters for the IP module are shown below.



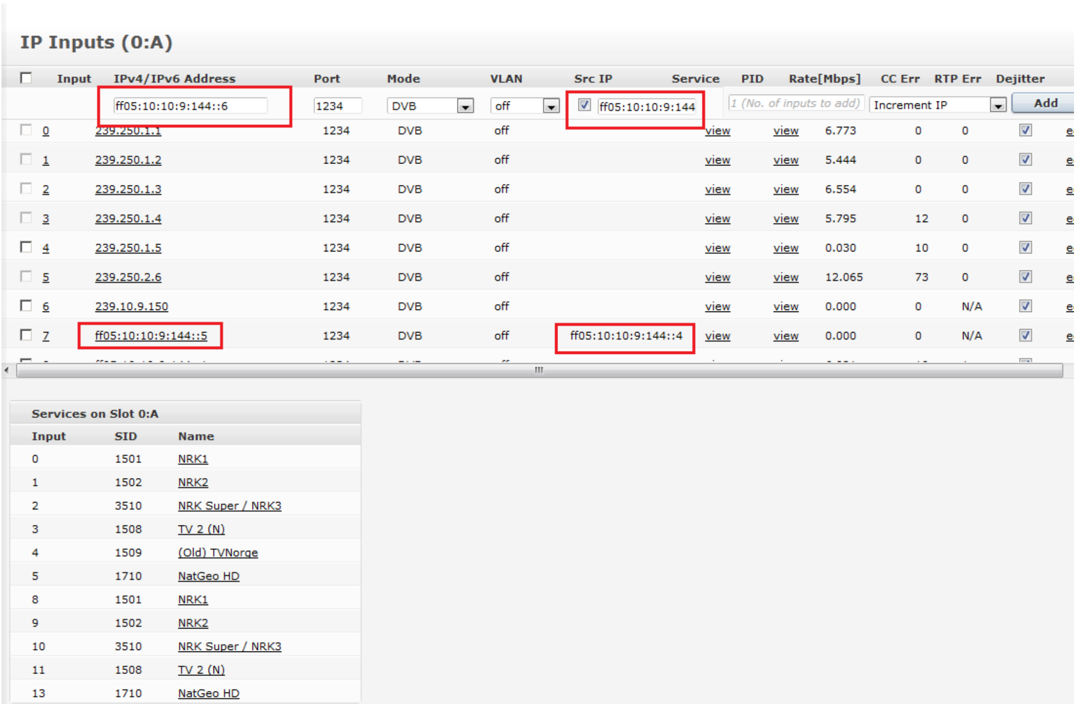
The following parameters are available:

Sync	Interval of the sync byte, usually 188
Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Active Source	IP address for the MPTS/SPTS source (Used for IGMP v3)

5.4.1.1 Setup of IPv6 input

The Switch+IP input module supports IPv6 multicast and unicast inputs. When using standard IPv6 address syntax (128 bits, ':' instead of '.'), the GUI will interpret the address as an IPv6 address.

The VLAN setup is independent on the choice of IPv4 or IPv6.
Source IP address has to match the IP format used for the destination IP address.



5.4.1.2 Source filtering on Switch IP input.

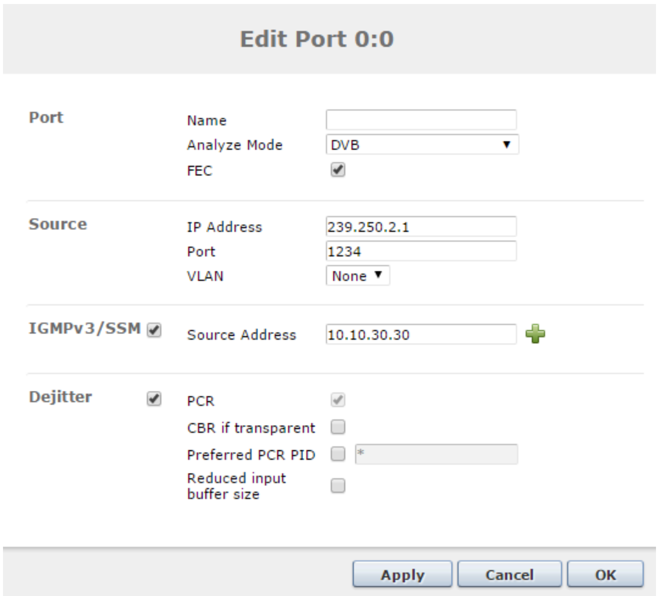
On the IP input, it is possible to use different mechanisms in order to filter on the Source IP address of the incoming multicast.

Source filtering (relevant where 1 source is specified) is only available in Switch+IP input cards .

System behavior for different combinations of IGMP (version 2 or 3) input configurations:

Sources	Source filter	Comment
0	Off	GUI has not enabled filtering and no source is specified.
1	On	Only the multicast with the matching source address is available on the input. This does not require IGMPv3
>1	Off	In this mode all IGMPv3 sources are mapped to the same port. I.e. it is not possible to reuse the MCAST:PORT pair on other inputs Please note, only one of these sources should be active at a given time.

IGMPv3/SSM Source filtering is shown in figure below



If it is required that multiple sources of the same multicast be enabled concurrently, then these will need to be subscribed to on unique input ports, each specifying their source IP address.

5.4.1.3 IP Input with FEC

For **IP** input modules with FEC, the input window has an additional checkbox for each stream, allowing you to enable FEC.

For the **IP** input module with FEC there are additional status parameters are available, on top of the generic **Sync**, **Effective Bitrate**, **Total Bitrate**, and **Active Source**, -

Sync	188	
Effective Bitrate:	19.663	Mbps
Total Bitrate	20.910	Mbps
Active Source	10.10.34.21	
Unrecoverable Packets	0	
Recovered Packets	0	
FEC RTP Errors	0	
FEC Column IP Packets	211	IP packets/s
FEC Row IP Packets	316	IP packets/s

The additional parameters are described in further detail below:

Unrecoverable Packets	Number of lost data packets that cannot be recovered with FEC
Recovered Packets	Number of data packets recovered with FEC
FEC RTP Errors	Number of missing FEC packets
FEC Column IP Packets	Number of Column FEC packets per second (packet rate)
FEC Row IP Packets	Number of Row FEC packets per second (packet rate)
FEC Matrix Rows (D)	Number of rows in the FEC matrix of the incoming stream
FEC Matrix Columns (L)	Number of columns in the FEC matrix of the incoming stream

The combination of Unrecoverable Packets, Recovered Packets, and FEC RTP Errors is a good indication of network quality.

5.4.5.4.2 Removing a Multicast Input

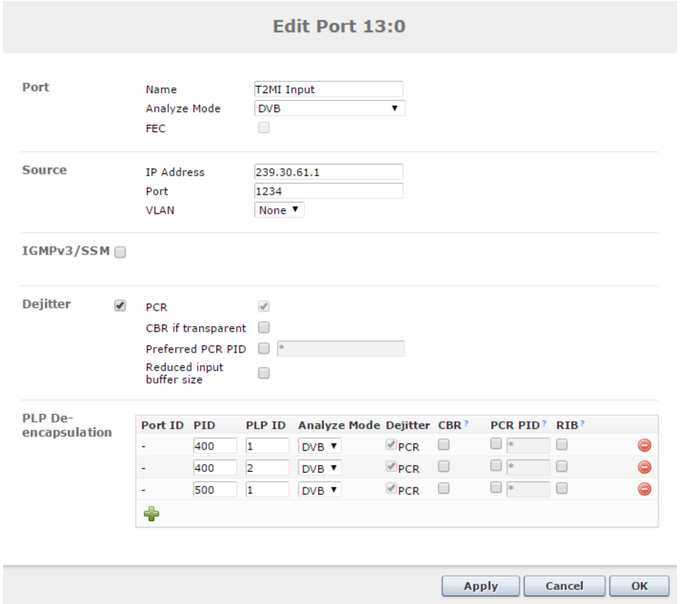
Select the input to be removed by clicking on the on the right of the input entry. It is possible to select multiple inputs at the same time, or all by clicking the top level icon.

Once selected, click the **Delete X selected** button in the bottom right hand of the input pane.

Please note that you can only remove inputs that are currently not in use. To delete these streams, the associated output service must first be removed/disabled.

5.4.5.4.3T2MI De-encapsulation

The following additional information is displayed in edit option for Dual IP modules configured in dip-t2mi-decap mode.



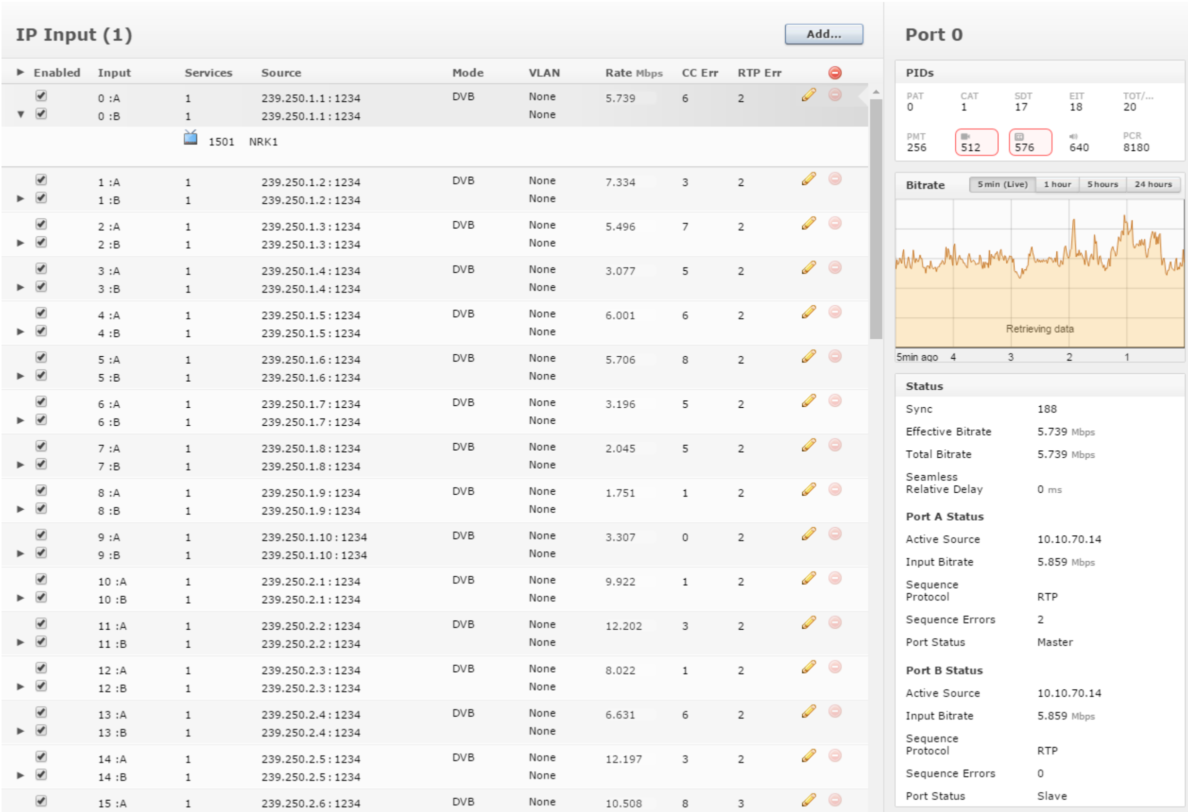
The options available are:

Port ID	Specify the Port ID for T2MI stream
PID	This is T2MI stream PID
PLP ID	This is T2MI stream PLP ID of the required stream
Mode	Select one of the following modes: ○ DVB ○ DVB (SDT) ○ MPEG ○ ATSC ○ OFF
De-jitter	PCR dejitter will be default on when enabling a new de-encapsulation. The user can choose to specify the PCR PID and to do CBR dejitter if transparent output routing
CBR if transparent	This de-jitter mechanism will use the incoming CBR total bitrate as a guide for the clock source of the stream. This is only valid for transparent mapped and PID imported outputs
Preferred PCR pid	This allows you to set a PCR PID in the input multiplex as a priority to use for de-jittering. If this PID is not available, then the next valid detected PCR will be used. This is only valid for transparently mapped streams.
Reduced Input buffer size	Enable or disable Reduced Input Buffer for introducing a low latency dejitter function.

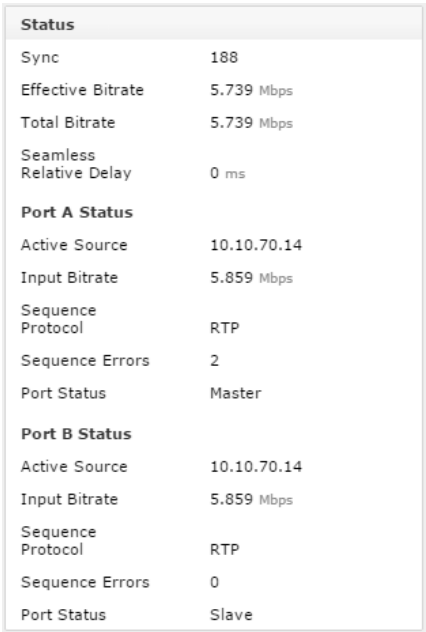
5.4.1.4 Seamless IP Input

The Seamless IP input module allows two input interfaces to be connected to different network sources, but for the system, this is a single module. The same multicasts are subscribed to on both interfaces. These multicasts will generally come from the same synchronized source, but if not, then it is possible to use the 'Non Syncronised' option which will allow fast, but not seamless switching.

All function and status normally associated with IP input cards are present for the logical module. In addition data rate, sequence errors, and relative delay for each stream are reported for every input. Moreover, alarms related to the network interface and stream alarms (e.g. "No bitrate") appear as warnings if they occur only on a single interface. "Link down on interface A or B" is a major alarm. If alarms appear on both interfaces, they will act as for normal IP input cards, and be a single alarm with the same alarm ID as used on other IP input cards.



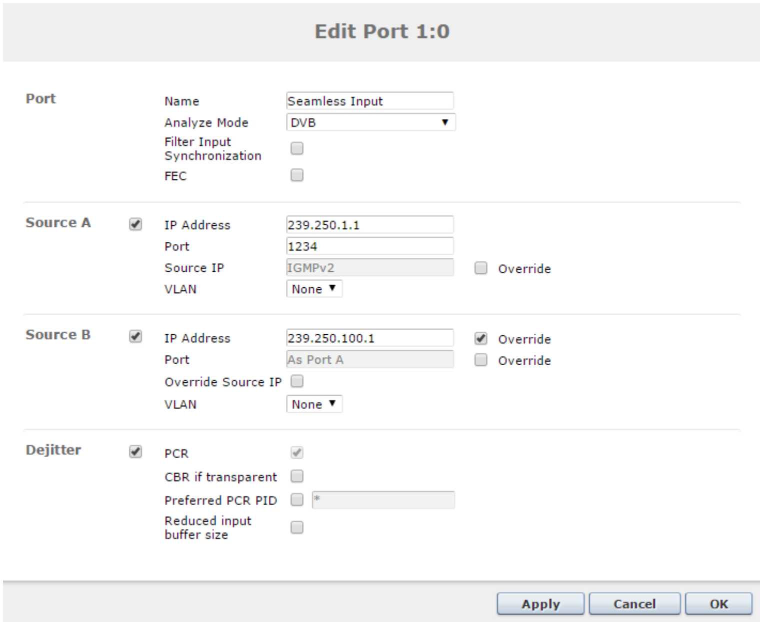
The following information is displayed in status parameters for Seamless IP Input configuration:



Seamless Relative delay	Seamless relative delay in ms will be displayed.
Active source	Source IP address
Input Bitrate	Source Input Bitrate in Mbps.
Sequence Protocol	Seamless protocol in use, either **RTP** or **UDP**.
Sequence Errors	Source sequence errors since last reset
Port Status	Either Master or Slave depending on which is the main port

5.4.6.1.1 Unique Configuration of input ports

IP settings can be configured different on the two IP ports in Seamless Input mode. If required to be different from port A, the checkbox can be enabled and the new parameter entered.



The paramaters presented here are the same as a standard IP Input except for the following:

Filter Input Syncronisation	This should be enabled on sources that are not syncronised from the same source. In this mode, the behavior differs from the Seamless IP mode in that the current source will switch if there is a 100ms with 0 bitrate on the input multicast.
Override	By default Source B will inherit the same as Source A. If it is required to change this, you can override each parameter.

5.4.6.1.2 Non-Syncronized Inputs

With the Seamless IP Input module, it is possible to configure two non-syncronized multicasts. In this mode it is required to enable the 'Filter input synronization' option for the port in order to filter the normally present alarm.

In this mode, the behavior differs from the Seamless IP mode in that the current source will switch if there is a 100ms with 0 bitrate on the input multicast.

More details on this can be found in Chapter 12.1.5.

5.4.1.5 Dual IP Input

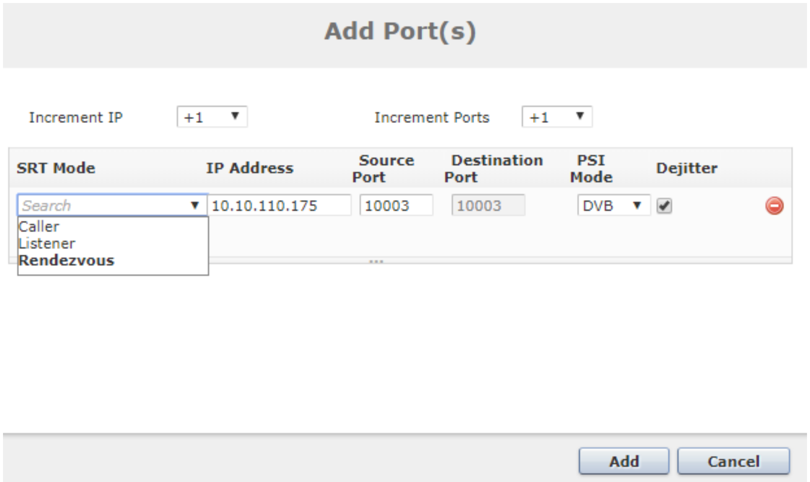
The Dual IP input module allows two individual input interfaces to be connected to network sources, but for the system, this is exactly as two IP input cards. The input streams can be either SPTS (VBR or CBR mode) or MPTS. to configure the module.

All function and status normally associated with IP input cards are present for the module but the total Input Bitrate for both IP ports cannot exceed 850 Mbps or 250 services, ie the limit is shared between the two ports.

An alarm ("Back-plane bitrate exceeded. Packet dropped.") will be raised when the 850Mbps backplane limitation is exceeded.

5.4.1.6 SRT IP Input

The Secure Reliable Transport (SRT) input is a new generation IP module. It's an open source video transport protocol optimized for unreliable networks (packet loss, jitter, and fluctuating bandwidth), typically used for transmissions over the Internet. End-to-end 128, 192 or 256 bit AES encryption is available. Different connection modes are provided for easy firewall traversal.



An SRT input connection can be configured as three different modes:

Caller	Actively trying to connect to a listener on a specific ip and port.
Listener	Listen for incoming caller on a specific port
Rendezvous	Listen for incoming caller on a specific port

It should be noted that in rendezvous mode, both the destination and source port will always be equal.

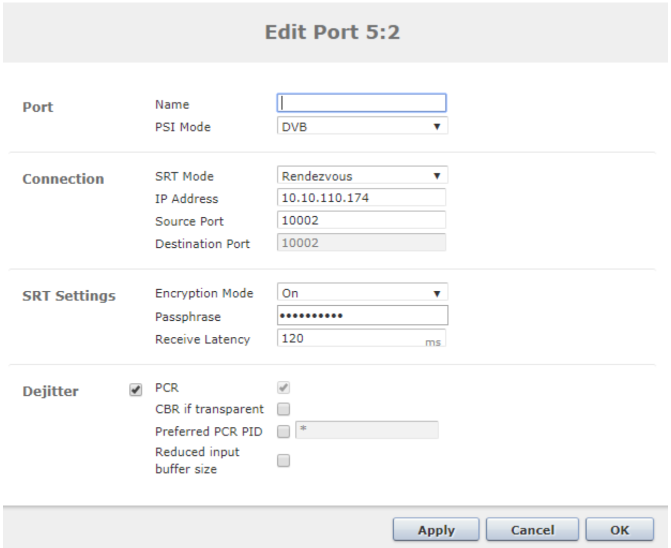
An SRT module will always use Port A as SRT Input, and Port B as SRT output. Each mode requires a specific license.

An example of an end-to-end SRT connection can be as follow:

Port B IP: 10.10.10.123 Output: Mode: Listener Source port: 20000

Port A IP: 10.10.10.234 Input: Mode: Caller IP: 10.10.10.123 Source port: 20000 Destination port: 30000

Here the output will configure an SRT listener on port 20000. The input will configure an SRT caller on port 30000 and will try to connect to the IP address 10.10.10.123 on port 20000.



The features presented here are as following:

Mode	Select SRT mode: Caller, Listener or Rendezvous
IP Address	Specify the IP address
Source Port	This will be the port from which SRT will send video data
Destination Port	Select port which SRT should try to connect to
Encryption Mode	Type of encryption: ON or OFF
Passphrase	The password. Minimum length is 10 characters
Receive latency	Set the latency input buffer. Gives time to the SRT to do retransmission on lost packets

i	The SRT module is limited by the CPU, thus in most cases the bitrate will limit the number of SRT connections. Recommended total bitrate for an SRT card is 35 Mbps for both input and output with full 256 AES encryption. Higher bitrate then the recommended value will increase the risk of CC error and triggering of the high CPU load alarm. If total the bitrate is kept bellow the recommended value, then the SRT card supports 32 inputs and 32 outputs.

5.4.2 DVB-S/S2/S2X Input

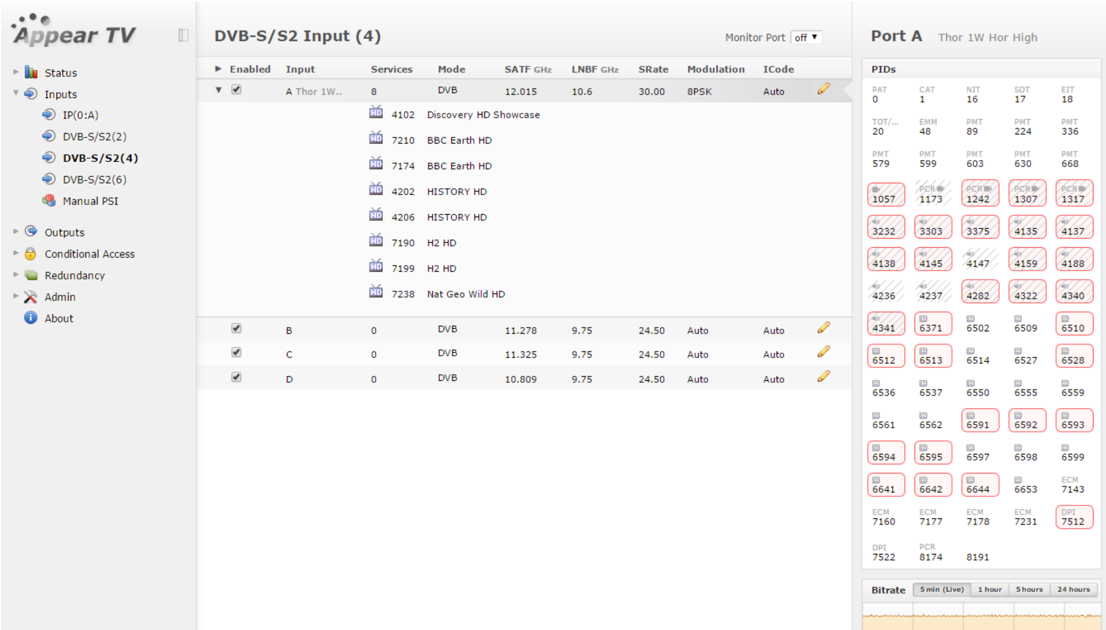
Each DVB-S/S2 module can receive up to four individual L-Band satellite input streams. The DVB-S/S2 module options are summarised below:

Parameter	DVB-S2 In (SR-100)	DVB-S2 Advanced (SR-110)	DVB-S2X In (SR-120)
System (standard)	DVB-S, DVB-S2	Auto, DVB-S, DVB-S2	Auto, DVB-S, DVB-S2
Satellite frequency[1]	0.950-2.150 GHz	0.950-2.150 GHz	0.950-2.150 GHz
Symbol rate	1-45 MBd	1-45 MBd (32APSK 38 MBd)	1-45 MBd (32APSK 39.9 MBd)
Constellation[2] (DVB-S)	Auto	Auto	Auto
Constellation (DVB-S2)	QPSK, 8PSK	Auto, QPSK, 8PSK, 16APSK, 32APSK	Auto (detects QPSK, 8PSK, 8APSK-L, 16APSK, 16APSK-L, 32APSK, 32APSK-L)
Code Rate[3] (DVB-S)	Auto, 1/2, 2/3, 3/4, 5/6, 7/8	Auto, 1/2, 2/3, 3/4, 5/6, 7/8	Auto
Code Rate (DVB-S2)	Auto, 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10	Auto, 1/2, 1/3, 1/4, 2/3, 2/5, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10	Auto (detects 1/2, 1/3, 1/4, 2/3, 2/5, 3/4, 3/5, 4/5, 5/6, 7/8, 8/9, 9/10, 13/45, 9/20, 8/15, 11/20, 5/9, 26/45, 28/45, 23/36, 25/36, 32/45, 13/18, 11/15, 7/9, 77/90)
Acqusition range	No	Auto, 150 kHz, 1 MHz, 2 MHz, 2.5 MHz, 5 MHz	Auto, 150 kHz, 1 MHz, 2 MHz, 2.5 MHz, 5 MHz
Spectrum inversion	Auto	Auto, Normal, Inverted	Auto
Roll off (DVB-S)	Auto	Auto	Auto
Roll off (DVB-S2)	Auto (detects 0.20, 0.25, 0.35)	Auto, 0.15, 0.20, 0.25, 0.35	Auto (detects 0.05, 0.10, 0.15, 0.20, 0.25, 0.35)
Pilot	On/Off	(auto)	(auto)
Multistream support	No	Yes (id 0-255)	Yes (id 0-255)
Short FEC frame support	No	Yes (auto)	No
PL Scrambling Sequence Type	No	Gold, Root	Gold, Root
PL Scrambling Sequence Index	No	0-262141	0-262141
PLP De-encapsulation	No	Yes	Yes
Blindscan	No	No	Yes

To configure the module:

Switch to the Inputs node in the Navigation Pane

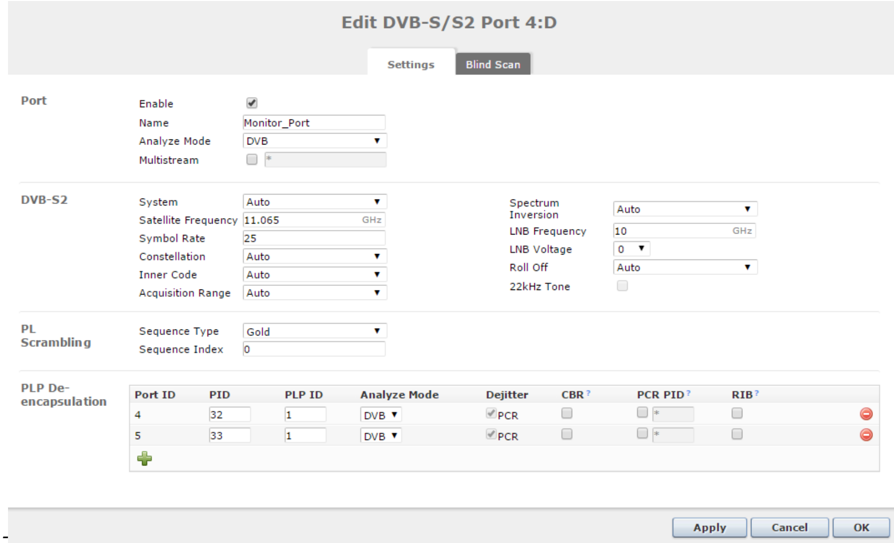
Select DVB S/S2 to display the module configuration (see Figure 5.17). Services available on all four input ports will be listed in this view.



The DVB-S/S2 node shows all major configuration settings as well as the current bitrate and service information.

Enable	Enable the corresponding input port
Input	Port on the ASI input module
Services	Number of services available on this port
Mode	Analysis mode of input port
SATF	Input Satellite frequency (GHz)
LNBF	Input LNB Frequency (GHz)
SRate	Input Symbol Rate
Modulation	Input signal modulation setting
ICode	Input signal Inner Code
Rate [Mbit/s]	Incoming data rate
CC Err	Continuity Counter Error – indicates that one or more packets are lost

The above list of parameters can be configured by clicking on the pencil icon to the right of each input. The pop up dialog below will be displayed:



In this dialog, parameters can also be modified depending on the configured mode and hardware version.

Port Setting:

Enable	Enable the corresponding input port
Name	This parameter allows for each port in a module to be labeled. This label is visible as a tooltip when the mouse cursor hovers over the port. Port names are shown in the alarms when a non-empty string is set as the name..
Analyze Mode	PSI/SI Analysis mode.
Multistream	If enabled, specify stream identifier

DVB-S2

System	Auto (SR-110 / SR-200) DVB-S DVB-S2 DVB-S2X
Satellite Frequency	Satellite Frequency in GHz
Symbol Rate	Symbol Rate – specify the symbol rate of the incoming DVB-S/S2 signal.
Constellation	Select one of the following modes: Auto (SR-110 / SR-200) QPSK 8PSK 16APSK (SR-110 / SR-200) 32APSK (SR-200)
ICode	Inner Code – specify the FEC overhead fraction
Spectrum Inversion	

LNB Frequency	LNB Frequency
LNB Voltage	LNB Voltage – select the output voltage from the dropdown box
Roll Off	Choose roll off percentage. Values available depend on module type.
22kHz Tone	Switch the 22kHz output signal on or off

	Depending on the hardware version and licensing, some parameters may not be available.

PL Scrambling:

Sequence Type	Multistream PLS (Physical Layer Scrambling). PLS is often referred to as the 'gold' or 'root' code and will be provided by your content provider if required.
Sequence Index	Default value is 0

PLP De-Encapsulation section:

Port ID	Specify the Port ID for T2MI stream
PID	This is T2MI stream PID
PLP ID	This is T2MI stream PLP ID of the required stream
Mode	Select one of the following modes: o DVB o DVB (SDT) o MPEG o ATSC o OFF
De-jitter	PCR dejitter will be default on when enabling a new de-encapsulation. The user can choose to specify the PCR PID and to do CBR dejitter if transparent output routing
CBR if transparent	This de-jitter mechanism will use the incoming CBR total bitrate as a guide for the clock source of the stream. This is only valid for transparent mapped and PID imported outputs
Preferred PCR pid	This allows you to set a PCR PID in the input multiplex as a priority to use for de-jittering. If this PID is not available, then the next valid detected PCR will be used. This is only valid for transparently mapped streams.
Reduced Input buffer size	Enable or disable Reduced Input Buffer for introducing a low latency dejitter function.

If a monitoring port is available on the hardware you can monitor any of the demodulated **DVB-S/S2** input signals, one of the **DVB-S/S2** input ports can be assigned to the output ASI monitor interface. The demodulated **DVB-S/S2** input signal will then be copied onto the monitor port for further analyzing or monitoring of the transport stream. Normal operation will not be affected if the monitoring port is used.

Refer to the general input analysis description at the start of this chapter to analyze the input. Click on the letter representing the input channel (A, B, C or D) to display the status parameters for the specific input port. The resulting display is shown in the figure below.

When clicking on an input port, the status parameters for this port are available in the right-hand status bar. Depending on the version of the module, various parameters are displayed.

Status	
Effective Bitrate	49.942 Mbps
Total Bitrate	57.489 Mbps
Sync	188
Input Power	-48 dBm
EbNo	8.1 dB/Hz
PER	0.00e+00
CNR	11.1 dB
Carrier Offset	-1.911 Mhz
Actual Frequency	11.524 GHz
Actual Symbol Rate	29.703 Mbaud
Actual Modulation	DVB-S2 8PSK
Actual Code Rate	2/3
Lock Status	Locked
Pilots	On
Input Streams	1
Stream ID	0
Coding & Modulation	CCM
Spectrum	Normal
Link Margin	4.5 dB
Roll Off	0.25

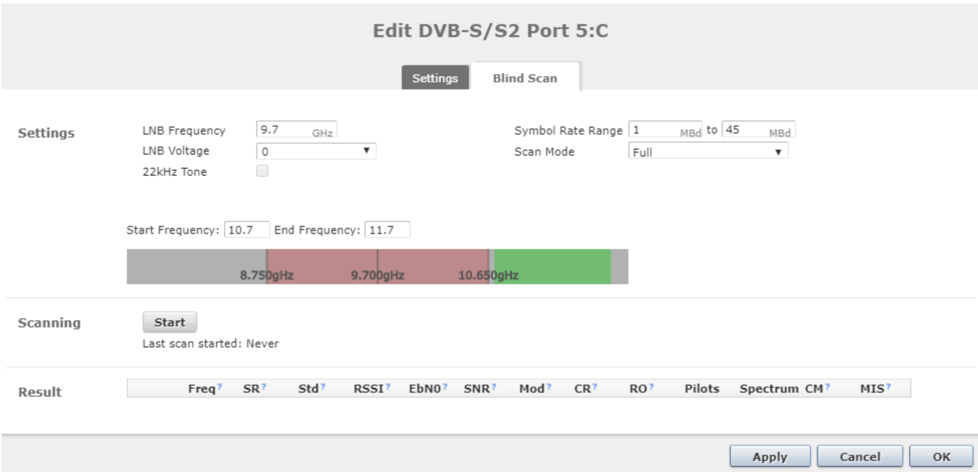
The following information is displayed:

Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Sync	MPEG sync number: 188 or 204
Input Power	Input power for the DVB-S/S2 signal in dBm
EbNo	Energy per bit/(Noise per 1Hz BW)
PER	Packet Error Rate
CNR	Signal Carrier to Noise Ratio, indicated in dB
Carrier Offset	Carrier offset
Actual Frequency	Frequency reported by the demodulator

Actual Symbol Rate	Symbol rate reported by the demodulator
Actual Modulation	Modulation reported by the demodulator
Actual Code Rate	Coding reported by demodulator
Lock Status	Lock status of the tuner
Pilots	Indicates if pilot tones are ON or OFF
Input Streams	Number of Input Streams if Multistream signal. It will show value '1' if it is not a Multistream signal.
Stream ID	If Multistream signal, it will indicate the Stream ID
Coding & Modulation	Indicates the Coding & Modulation of the input source
Spectrum	Normal or Inversed
Link Margin	Calculated link margin based on input power, CNR and modulation.
Roll Off	Roll Off range by demodulator

5.4.2.1 Blind Scan

The Edit Port dialog also offers a Blind Scan tab (SR-200). This feature is used to scan the input signal for DVB-S/S2/S2x carriers.

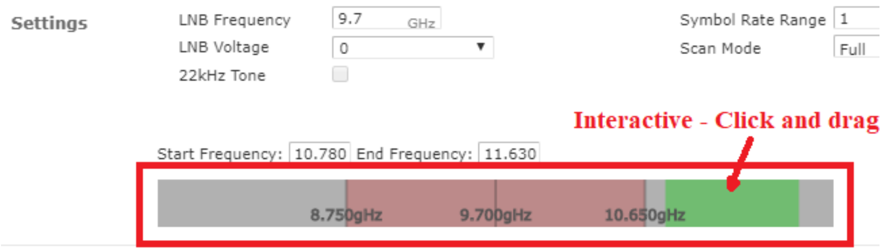


The following settings are available to configure the scan procedure:

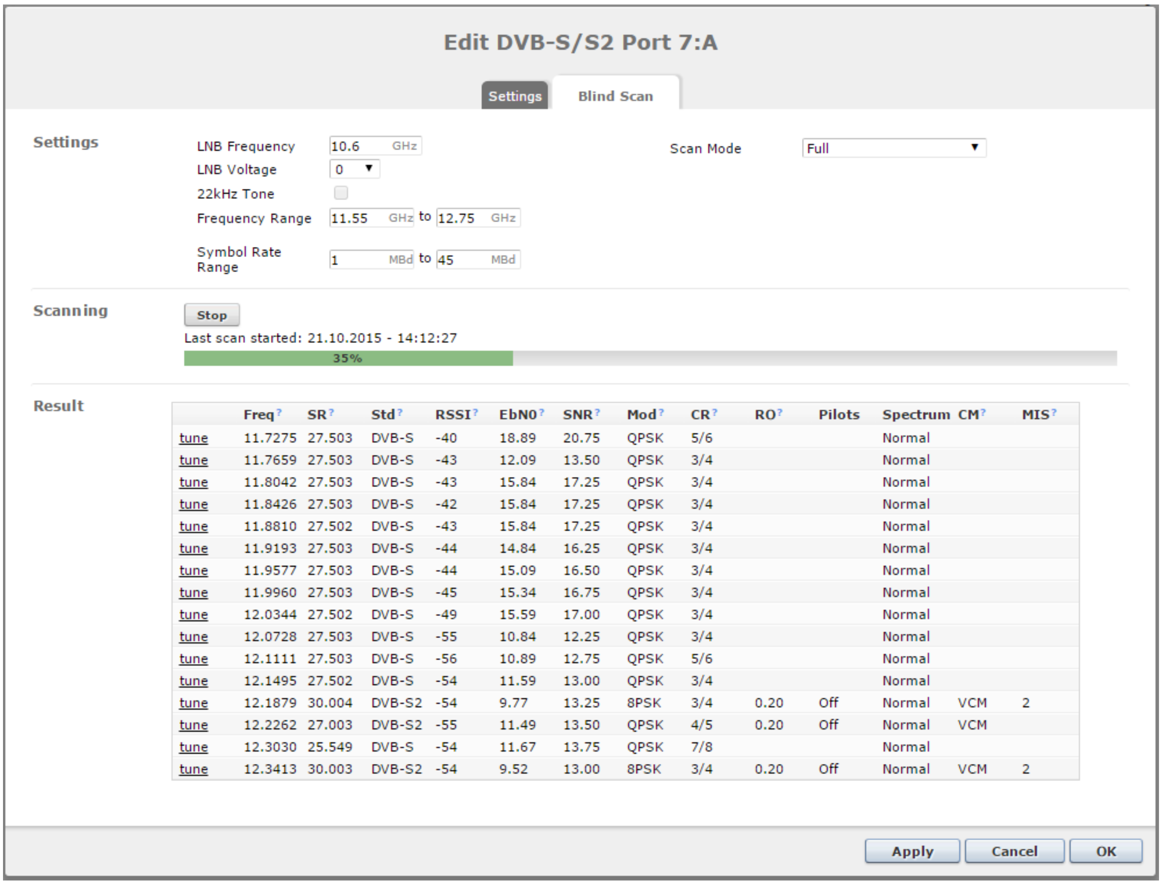
LNB Frequency	LNB Frequency required for the scan
LNB Voltage	Set if required for the LNB
22kHz Tone	Set if required for the LNB
Frequency range	Sets the start and stop frequency.
Symbol Rate range	Sets the minimum and maximum detected symbol rate.

Scan Mode	'Quick' or 'Full' scan. Quick scan only detects frequency and symbol rate.

GUI error is displayed if the frequency range is not valid. Scan range cannot be larger than 2.150 GHz, and start and end frequency must be within the valid values according to the LNB Frequency. Use the interactive frequency band panel to move the range (highlighted in green) across the spectrum, ensuring it always falls in a valid area (highlighted in grey) and it does not overlap with the LNB frequency area (highlighted in red), as shown in the picture below:



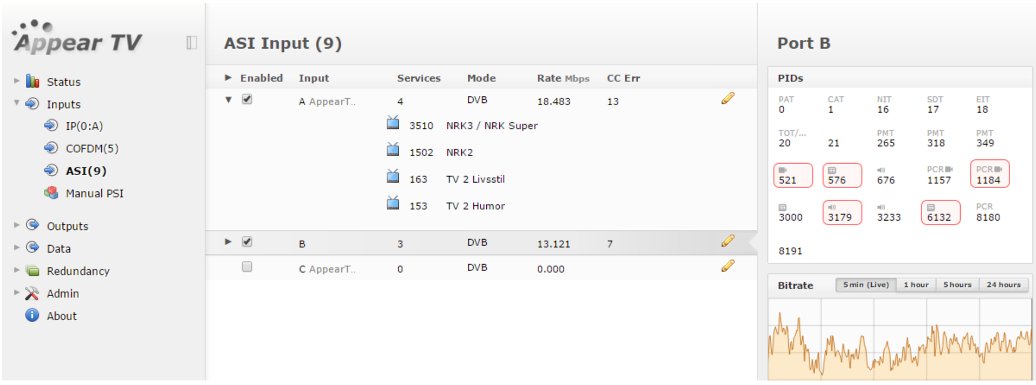
Start the scan by clicking the start/stop button. Carriers are displayed in the result list as they are detected. To configure the port and tune to one result click on the **tune** link to the left of each carrier.



5.4.3 ASI Input

The ASI input module can receive up to three/four individual ASI input streams depending on the hardware revision. Each ASI input can support up to 213Mbit/s. To configure the module:

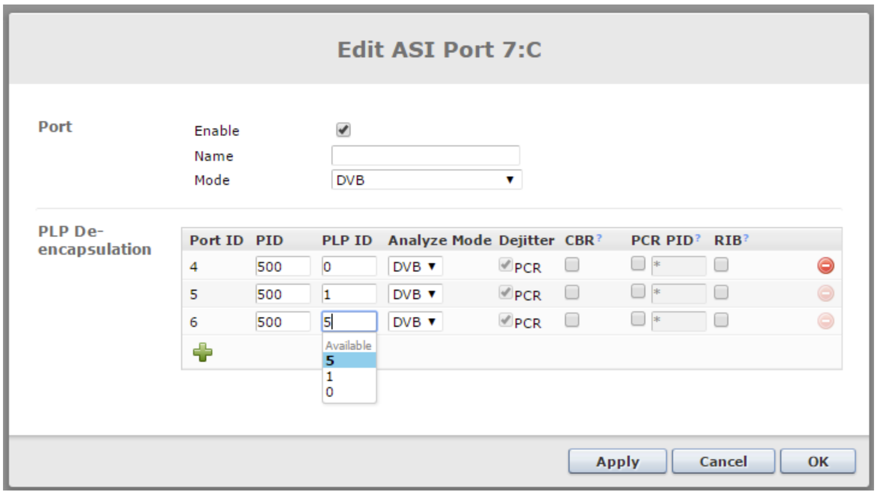
- Switch to the **Inputs** node in the **Navigation Pane**
- Select the **ASI** module you want to configure to display the module configuration.



The ASI node shows all configurable settings as well as the current bitrate and service information. The following parameters are available:

Enable	Enable the corresponding input port
Input	Port on the ASI input module
Services	Number of services available on this port
Mode	Analysis mode of input port
Rate [Mbit/s]	Incoming data rate
CC Err	Continuity Counter Error – indicates that one or more packets are lost

The above list of parameters can be configured by clicking on the pencil icon to the right of each input. The pop up dialog below will be displayed:



The following parameters are present under Port section:

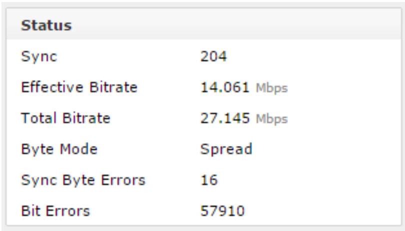
Enable	Enable the corresponding input port
Name	This parameter allows for each port in a module to be labeled. This label is visible as a tooltip when the mouse cursor hovers over the port. Port names are shown in the alarms when a non-empty string is set as the name.
Mode	Select one of the following modes: ○ DVB ○ DVB (SDT) ○ MPEG ○ ATSC ○ OFF The default mode is DVB. If the incoming transport stream is not DVB compliant, use MPEG mode instead.

The following parameters are present under PLP De-Encapsulation section:

Port ID	Specify the Port ID for T2MI stream
PID	This is T2MI stream PID
PLP ID	This is T2MI stream PLP ID of the required stream
Mode	Select one of the following modes: ○ DVB ○ DVB (SDT) ○ MPEG ○ ATSC ○ OFF
De-jitter	PCR dejitter will be default on when enabling a new de-encapsulation. The user can choose to specify the PCR PID and to do CBR dejitter if transparent output routing

CBR if transparent	This de-jitter mechanism will use the incoming CBR total bitrate as a guide for the clock source of the stream. This is only valid for transparent mapped and PID imported outputs
Preferred PCR PID	This allows you to set a PCR PID in the input multiplex as a priority to use for de-jittering. If this PID is not available, then the next valid detected PCR will be used. This is only valid for transparently mapped streams.
Reduced Input buffer size	Enable or disable Reduced Input Buffer for introducing a low latency dejitter function.

When clicking on an input port, the status parameters for this port are available in the right hand status bar. Depending on the version of the module, various parameters are displayed.



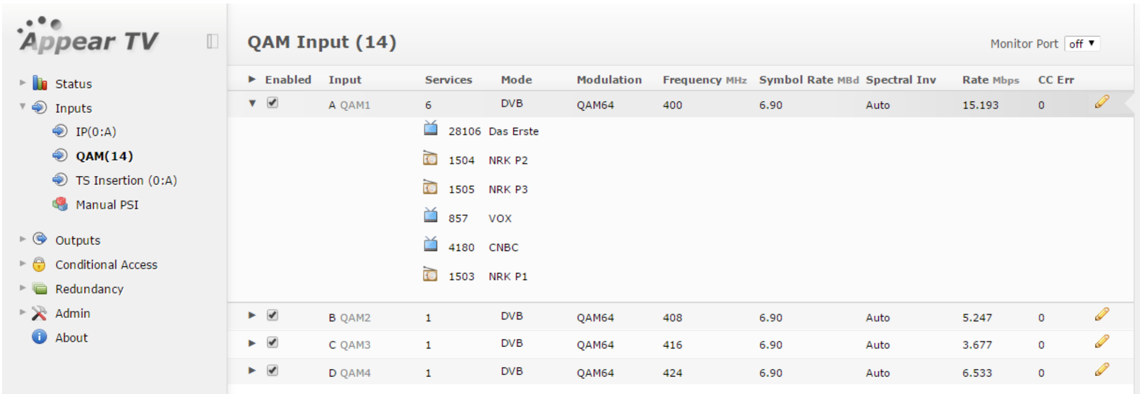
The following information is displayed:

Sync	MPEG sync number: 188 or 204
Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Byte Mode	The byte mode specifies how the TS data is transported over the ASI link. **Burst Mode** – All TS data bytes are sent without any idle symbols in between **Spread Mode** – The SI specification requires at least one idle byte between each data byte, and each packet start indicator (0x47) is preceded with at least two idle bytes. The ASI output stream in **Spread Mode** guarantees that each data byte is preceded with two idle symbols. This effectively reduces the maximum data rate to 1/3 of the maximum ASI output rate, i.e. (213/3) Mbps. If higher rates are required, use **Burst Mode**.
Sync Byte Errors	Number of sync byte errors on the incoming stream
Bit Errors	Number of bit errors on the incoming stream

5.4.4 QAM/DVB-C Input

The CR-100/110 **QAM/DVB-C** input modules can receive up to four individual **QAM** frequencies. The QAM/DVB-C input modules comes in 2 HW versions; a 2 slot version referred to as QAM input and a 1 slot version referred to as DVB-C input. The CR-200 CableTV Input module can receive up to 16 individual QAM frequencies. To configure the module:

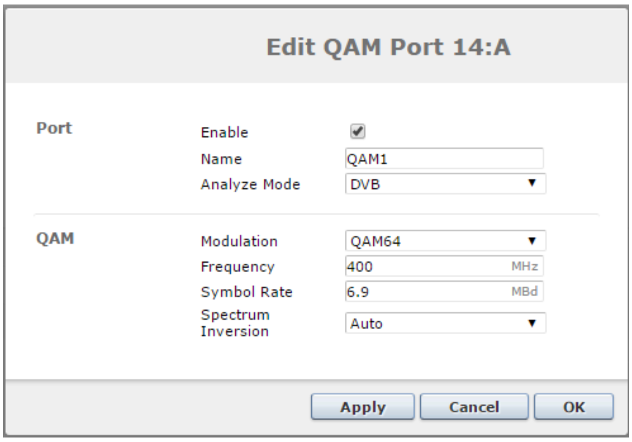
- Switch to the **Inputs** node in the **Navigation Pane**
- Select the **QAM** module you want to configure and the module configuration window will be displayed (see figure below)



The QAM/DVB-C input window shows all configurable settings as well as the current bitrate and service information. The following parameters are displayed

Enable	Enable the corresponding input port
Input	Port on the ASI input module
Services	Number of services available on this port
Mode	Analysis mode of input port
Modulation	Current modulation of input port
Freq [MHz]	QAM frequency in MHz
Symbol Rate [MBd]	Specify the Symbol Rate in MBd, valid range is 0.452 – 7.23 MBd
Spectral Inv	Specify the Spectral Inversion, choose from Auto, Normal, or Inverted
Rate [Mbit/s]	Incoming data rate
CC Err	Continuity Counter Error – indicates that one or more packets are lost

The above list of parameters can be configured by clicking on the pencil icon to the right of each input. The pop up dialog below will be displayed:



Enable	Enable the corresponding input port
Name	This parameter allows for each port in a module to be labeled. This label is visible as a tooltip when the mouse cursor hovers over the port. Port names are shown in the alarms when a non-empty string is set as the name.
Mode	Select one of the following modes: ○ DVB ○ DVB (SDT) ○ MPEG ○ ATSC ○ OFF The default mode is DVB. If the incoming transport stream is not DVB compliant, use MPEG mode instead.
Modulation	Specify the type of modulation, select from one of the following: ○ QAM16 ○ QAM32 ○ QAM64 ○ QAM128 ○ QAM256
Frequency	Specify the QAM frequency in MHz, valid range is 170k – 887Mhz
Symbol Rate	Specify the Symbol Rate in MBd, valid range is 0.452 – 7.23 MBd
Spectrum Inversion	Specify the Spectral Inversion, choose from Auto, Normal, or Inverted

When clicking on an input port, the status parameters for this port are available in the right hand status bar. Depending on the version of the module, various parameters are displayed.

Status	
Frequency	400.000 MHz
Symbol Rate	6.900 MBd
Frontend Locked	Locked
Carrier Status	Locked
BER	< 1.00e-09
SNR	38.65 dB
Power Level	-18 dBm
Sync	188
Effective Bitrate	16.003 Mbps
Total Bitrate	38.153 Mbps
Frequency Offset	-1 kHz
Timing Offset	4 ppm
Spectral Inversion	Normal
Modulation	QAM64

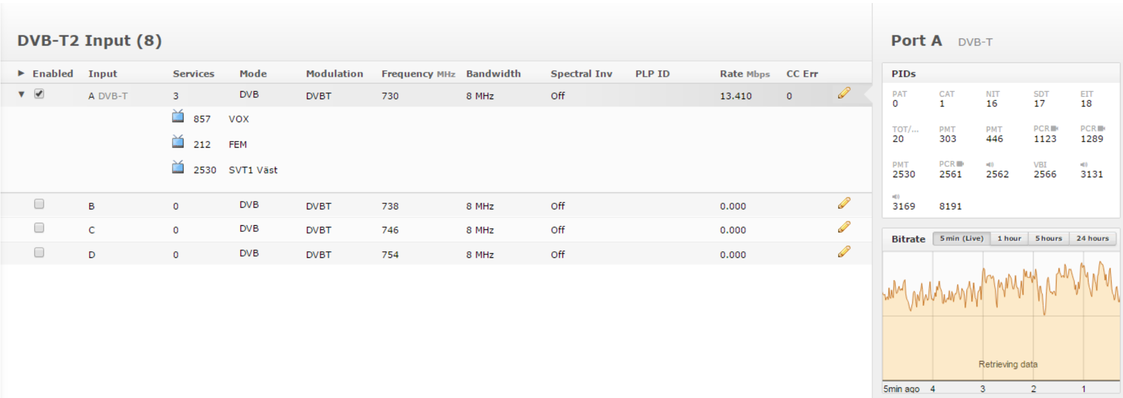
The following information is displayed:

Frequency	Currently tuned frequency in MHz
Symbol Rate	Symbol Rate in MBd
Frontend Locked	Lock status of the tuner
Carrier Status	Status of the tuning process
BER	Bit Error Rate
SNR	Signal to Noise Ratio
Power Level	Power level of the input signal. Please note that this is the power level after the internal 4 way splitter.
Sync	MPEG sync number: 188 or 204
Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Frequency Offset	Frequency offset of the tuned carrier
Timing Offset	Timing offset of the tuned carrier
Spectral Inversion	Specify the Spectral Inversion, choose from Auto, Normal, or Inverted
Modulation	Modulation of the currently tuned channel

5.4.5 COFDM/ DVB-T/T2 Input

The COFDM / DVB-T/T2 input modules can receive up to four individual DVB-T/T2 frequencies. The COFDM/DVB-T input modules comes in 3 HW versions; a 2 slot version referred to as COFDM input and 1 slot versions referred to as DVB-T or DVB-T/T2 input. To configure the module:

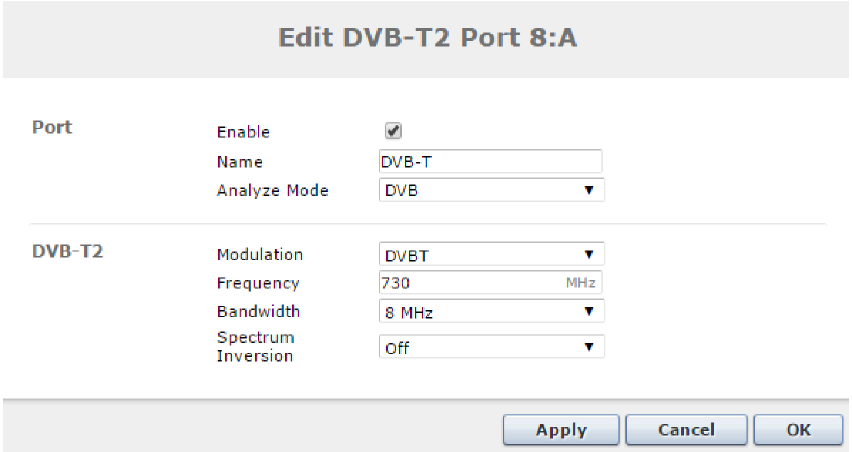
- Switch to the Inputs node in the **Navigation Pane**
- Select the COFDM/DVB-T/T2 module you want to configure and the module configuration window will be displayed. Services available on all four COFDM input frequencies will be listed in this view.



The COFDM / DVB –T/T2 input window shows all configurable settings as well as the current bitrate and service information. The following parameters are available:

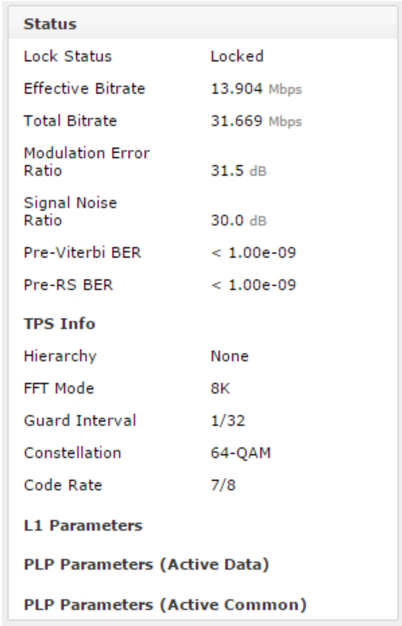
Input	Port on the COFDM/DVB-T/T2 input module
Services	Number of services available on this port
Mode	Analysis mode of input port
Modulation	DVB-T or DVB-T2 (T2 input module only)
Frequency	Input carrier frequency
Bandwidth	Input carrier bandwidth
Spectrum Inv	Current Spectrum inversion setting
PLP ID	Input PLP ID (T2 input module only)
Rate [Mbit/s]	Incoming data rate
CC Err	Continuity Counter Error – indicates that one or more packets are lost

The above list of parameters can be configured by clicking on the pencil icon to the right of each input. The pop up dialog below will be displayed:



Enable	Enable the corresponding input port
Name	This parameter allows for each port in a module to be labeled. This label is visible as a tooltip when the mouse cursor hovers over the port. Port names are shown in the alarms when a non-empty string is set as the name.
Mode	Select one of the following modes: ○ DVB ○ DVB (SDT) ○ MPEG ○ ATSC ○ OFF The default mode is DVB. If the incoming transport stream is not DVB compliant, use MPEG mode instead.
Modulation	Specify the type of modulation, select from one of the following: ○ DVBT ○ DVBT2
Frequency	Specify the QAM frequency in MHz, valid range is 170k – 887Mhz
Bandwidth	Specify the Signal bandwidth (6MHz – 8MHz)
Spectrum Inversion	Specify the Spectral Inversion, choose from Off or Inverted

When clicking on an input port, the status parameters for this port are available in the right hand status bar. Depending on the version of the module, various parameters are displayed.



Lock Status	Lock status of the tuner
Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Modulation Error Rate	Modulation Error Radio in dB - a typical good reading is between 30 and 40 (the higher the better).
Signal Noise Ratio	Signal to Noise Ratio – represents how much the signal has been corrupted by noise.
Pre-Viterbi BER	Bit error rate before Viterbi error correction.
Pre-RS BER	Bit error rate after Viterbi / before Reed Solomon error correction
Hierarchy	Hierarchy of the currently tuned channel.
FFT Mode	Fast Fourier Transform Mode of the currently tuned channel.
Guard Interval	Guard Interval of the currently tuned channel.
Constellation	Constellation of the currently tuned channel.
Code rate	Code rate of the currently tuned channel

Additional parameters for DVB-T Input card (1 slot version).

Timing Offset	The value of timing offset is in ppm, will depend on the input stream.
Stream	Input Stream.

5.4.6 8VSB Input

The **8VSB** input module can receive up to four individual **8VSB** input streams. To configure the module:

- Switch to the **Inputs** node in the **Navigation Pane**
- Select the **8VSB** module you want to configure to display the module configuration. Services available on all four **8VSB** input ports will be listed in this view.

The 8VSB input window shows all configurable settings as well as the current bitrate and service information. The following parameters are available:

Enable	Enable the corresponding input port
Input	Port on the ASI input module
Services	Number of services available on this port
Mode	Analysis mode of input port
Rate [Mbit/s]	Incoming data rate
Freq[MHz]	Specify the currently tuned frequency in MHz, valid range is 47 – 861MHz.
CC Err	Continuity Counter Error – indicates that one or more packets are lost

To monitor any of the demodulated 8VSB input signals, one of the 8VSB input ports can be assigned to the output ASI monitor interface. The demodulated 8VSB input signal will then be copied onto the monitor port for further analyzing or monitoring of the transport stream. Normal operation will not be affected if the monitoring port is used.

The above list of parameters can be configured by clicking on the pencil icon to the right of each input.

When clicking on an input port, the status parameters for this port are available in the right hand status bar. Depending on the version of the module, various parameters are displayed.

Status Port A

Sync	No	
Effective Bitrate:	0.000	Mbps
Total Bitrate	0.000	Mbps
Lock Status	No	
Level	-105	dBmV
MER	0	dB

Sync	MPEG sync number: 188 or 204
Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Lock Status	Lock status of the tuner

Level	RF level measured in dBmV
MER	Modulation Error Radio in dB - a typical good reading is between 30 and 40 (the higher the better).

5.4.7 QAM-B Input

The **QAM-B** input module can receive up to four individual **QAM-B** input streams. To configure the module:

- Switch to the **Inputs** node in the **Navigation Pane**
- Select the **QAM-B** module you want to configure to display the module configuration .Services available on all four **QAM-B** input ports will be listed in this view.

The QAM-B input window shows all configurable settings as well as the current bitrate and service information. The following parameters are available:

Enable	Enable the corresponding input port
Input	Port on the ASI input module
Services	Number of services available on this port
Mode	Analysis mode of input port
Rate [Mbit/s]	Incoming data rate
Freq[MHz]	Specify the currently tuned frequency in MHz, valid range is 47 – 861MHz.
Modulation	Modulation of the carrier
CC Err	Continuity Counter Error – indicates that one or more packets are lost

To monitor any of the demodulated QAM-B input signals, one of the QAM-B input ports can be assigned to the output ASI monitor interface. The demodulated QAM-B input signal will then be copied onto the monitor port for further analyzing or monitoring of the transport stream. Normal operation will not be affected if the monitoring port is used.

The above list of parameters can be configured by clicking on the pencil icon to the right of each input.

When clicking on an input port, the status parameters for this port are available in the right hand status bar. Depending on the version of the module, various parameters are displayed.

Status Port A

Input	Sync	No	
	Effective Bitrate:	0.000	Mbps
	Total Bitrate	0.000	Mbps
	MER	25	dB
	Lock Status	No	
	Level	0	dBmV

Sync	MPEG sync number: 188 or 204
Effective Bitrate	Effective bitrate of the input stream
Total Bitrate	Total bitrate of the input stream
Lock Status	Lock status of the tuner
Level	RF level measured in dBmV
MER	Modulation Error Radio in dB - a typical good reading is between 30 and 40 (the higher the better).

5.4.8 ISDB-T Input

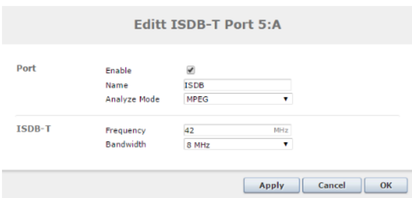
The ISDB-T input module can receive up to four individual Frequencies. To configure the module:

- Switch to the Inputs node in the **Navigation Pane**
- Select the ISDB-T module you want to configure and the module configuration window will be displayed. Services available on all four ISDB-T input frequencies will be listed in this view.

The ISDB-T input window shows all configurable settings as well as the current bitrate and service information. The following parameters are available:

Enable	Enable the corresponding input port
Input	Port on the ASI input module
Services	Number of services available on this port
Mode	Analysis mode of input port
Freq[MHz]	Specify the currently tuned frequency in MHz, valid range is 47 – 861MHz.
Bandwidth	Input signal bandwidth (6 – 8 MHZ)
Rate [Mbit/s]	Incoming data rate
CC Err	Continuity Counter Error – indicates that one or more packets are lost

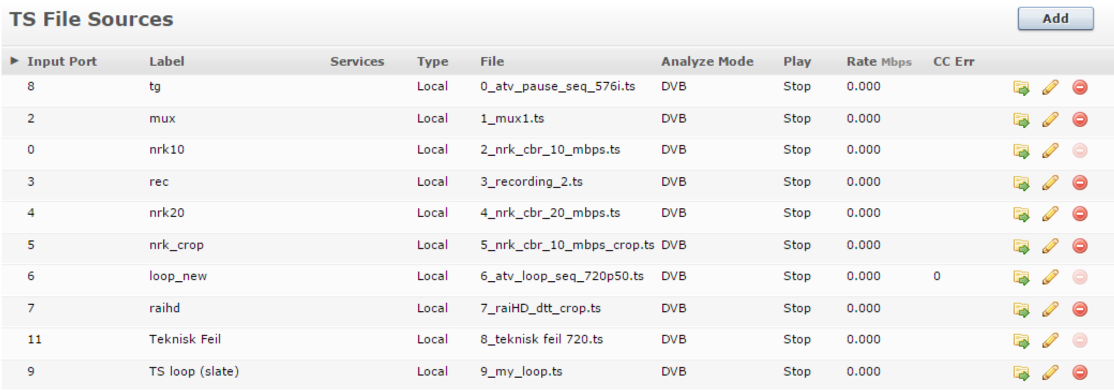
The above list of parameters can be configured by clicking on the pencil icon to the right of each input.



Name	This parameter allows for each port in a module to be labeled. This label is visible as a tooltip when the mouse cursor hovers over the port. Port names are shown in the alarms when a non-empty string is set as the name..

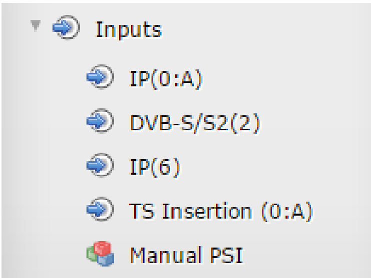
5.5 TS Insertion

The TS insertion feature allows the upload and playout od pre-generated TS files onto any processing/output module. It is only available on Switch modules with an IP Input port, ie Dual IP Input, Input+Output or Seamless IP Input.



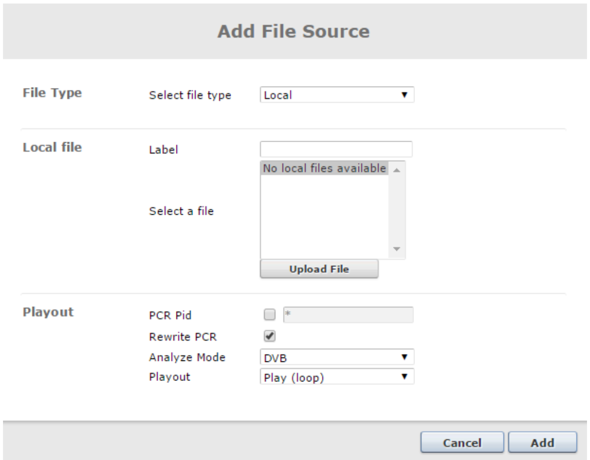
Input Port	Label	Services	Type	File	Analyze Mode	Play	Rate Mbps	CC Err
8	tg		Local	0_atv_pause_seq_576i.ts	DVB	Stop	0.000	
2	mux		Local	1_mux1.ts	DVB	Stop	0.000	
0	nrk10		Local	2_nrk_cbr_10_mbps.ts	DVB	Stop	0.000	
3	rec		Local	3_recording_2.ts	DVB	Stop	0.000	
4	nrk20		Local	4_nrk_cbr_20_mbps.ts	DVB	Stop	0.000	
5	nrk_crop		Local	5_nrk_cbr_10_mbps_crop.ts	DVB	Stop	0.000	
6	loop_new		Local	6_atv_loop_seq_720p50.ts	DVB	Stop	0.000	0
7	raihd		Local	7_raiHD_dtt_crop.ts	DVB	Stop	0.000	
11	Teknisk Feil		Local	8_teknisk feil 720.ts	DVB	Stop	0.000	
9	TS loop (slate)		Local	9_my_loop.ts	DVB	Stop	0.000	

In order for TS insertion to be enabled, a valid 'ts-insertion' license must be present and a MicroSD card must be mounted on the MMI module. The **TS Insertion** user interface will be available under the Inputs tab:



5.5.1 Adding a file

Pushing the Add button under the TS Insertion page will bring up the following dialog:



The **Upload File** button can be used to select a file and upload it to the MicroSD card. After the file has been uploaded, it will appear in the "Local file" list, ready to be selected. For files larger than 50MB, FTP upload (see below) is recommended:

Select file type	Can be set to Local (local file on USD card), or NAS (networked attached storage).
Label	Text label to identify the contents of this TS file.
Select a file	Select a file for TS insertion. When more than one file is uploaded, the list will contain several files ready for playout.
PCR Pid	Leave unchecked for automatic PCR detection. May be used to force a specific PCR, if multiple PCR pids are present
Rewrite PCR	When checked, PCR/PTS and CC fields will be re-written at every loop point to hide the discontinuity at the TS loop point
Analyze Mode	Can be set to (Off, DVB, DVB SDT, MPEG, ATSC, DVB Test, DVB Non-Compliant) to select the PSI/SI system for the TS file to be inserted.
Playout	Can be set to Play (loop) or Stop. When set to Stop, the TS file will be configured and ready for playout, but playout does not start. When set to Play (loop), playout will start and loop at the end of the TS file.

5.5.2 SCP upload

For large files (50MB+) web upload may be slow, and SCP upload is a better alternative.

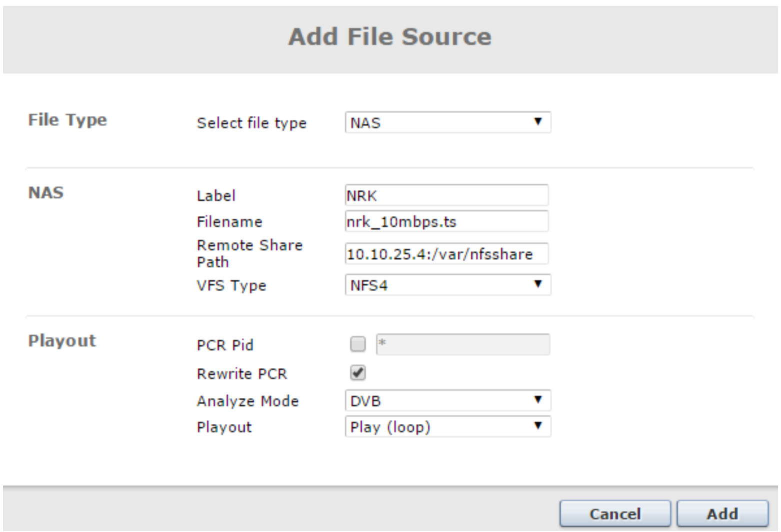
In order to upload, connect to the control port/MMI IP address with an SCP client. All TS files must be uploaded to the "/mnt/mmc/staged" folder using the 'asio' user. An example command would be as follows:

scp recording.ts asio@192.168.1.100:/mnt/mmc/staged/recording.ts

Once a file has been uploaded here it will appear in the "Local file" list using the "Adding a file" procedure as described above.

5.5.3 NAS playout

When adding a file from an external network attached storage (NAS), the Select file type must be set to NAS. The external NAS server must be reachable from the control port on the switch module. The add file dialog will then change to reflect that a NAS file source shall be added:



Filename	Exact filename of the file present on the external NAS
Remote Share Path	Remote share IP path on the external NAS (eg 10.10.10.10.:/path/to/folder)
VFS Type	Currently only NFS4 is supported

5.5.4 Edit TS File

All added TS streams can be edited at any time by using the edit icon (pencil). This may be used to stop or start file playout, change settings etc.

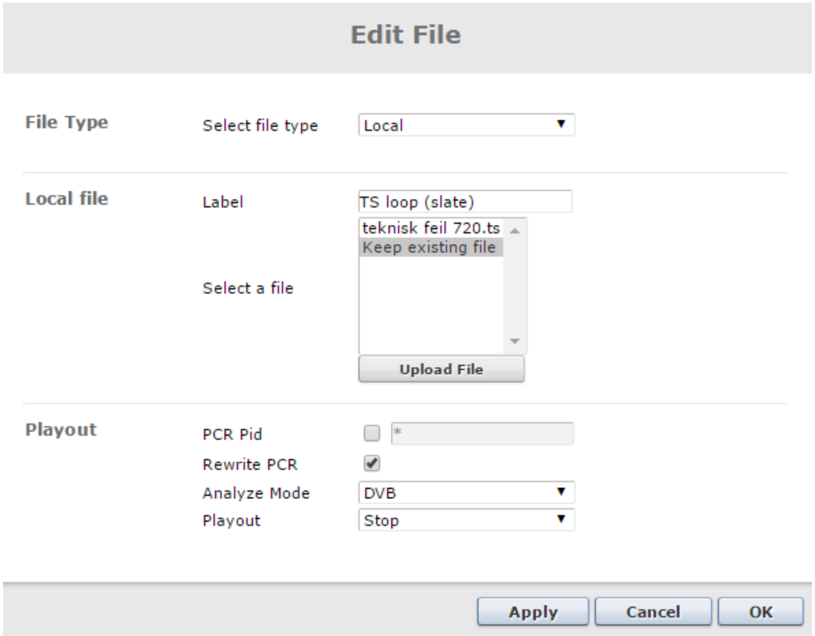


Figure 5.41- Edit TS file

The download icon (folder with arrow) allows the TS file to be downloaded from the SD card to the local computer. The delete icon (stop sign) will delete the TS file and all settings.

5.5.5 Output of TS File Sources

Once a valid TS has been uploaded and configured, it will be available to processing and output module in the same way as a standard input service. This can be used as a main output service, or configured as a backup source.

5.5.6 TS File Requirements

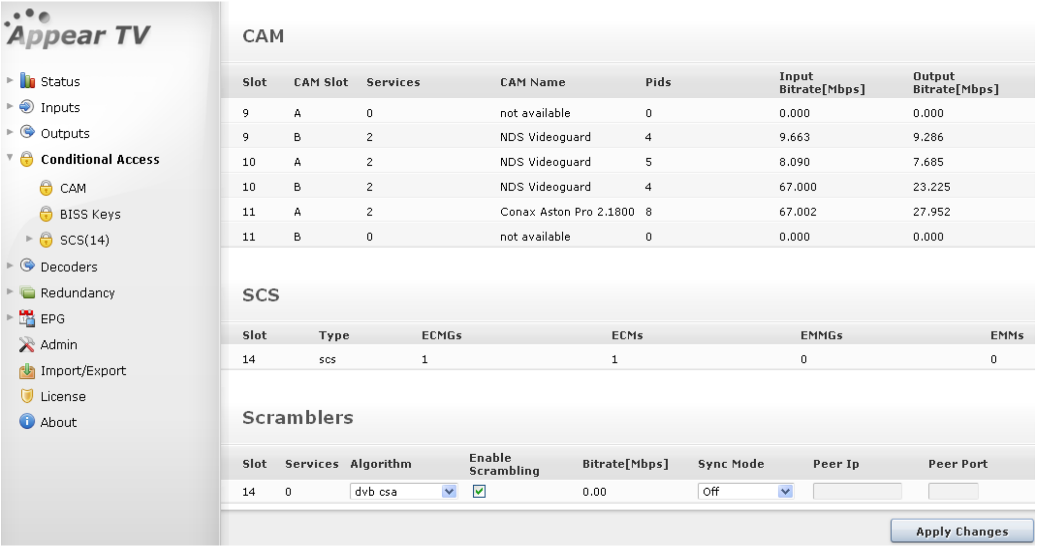
The requirements for the TS file/playback are:

Supported File storage	• Micro SD card (on MMI module) • external NAS reachable from the MMI control port • Total storage size is limited by the micro SD card (16GB for current ATV card), or the NAS
Supported File Format	• MPEG-2 TS file (*.ts)

	• File size is limited to 4GB per file (FAT32) • Note: Image files shall not be supported directly, but must be encoded into a TS using an external SW encoder
Performance Limits	• 10 files/streams total supported in GUI • Each selected file stream shall allocate one input port (out of the total 250 IP input ports) • 10 Mbps player total bit rate (sum of all streams)
CODEC support	• any CODEC supported (MPEG-2 SD/HD, H.264 SD/HD) • Recommended that the TS file has a closed GOP structure for looping purposes

6 Conditional Access Configuration

The unit supports descrambling and scrambling given that the required modules have been installed. Descrambling and scrambling are processing elements; hence they are not listed in the **Input** or **Output** nodes. These functions are found as part of the output service configuration.



The **Conditional Access** node displays existing configuration for CAMs, SCSs, Scramblers and Descramblers.

The following parameters are available:

CAM:

Services	Number of services being descrambled by the CAM
CAM Name	Name/provider of CAM module
PIDs	Number of PIDs currently being descrambled
Input Bitrate	Input bitrate into the CAM module
Output Bitrte	Output bitrate from the CAM module

Scramblers:

Algorithm	Select the correct algorithm to be used for Scrambling based on the currently installed licenses. If you feel your chosen algorithm is missing, please contact Appear TV support.

Descramblers:

Algorithm	Select the correct algorithm to be used for bulk descrambling based on the currently installed licenses. If you feel your chosen algorithm is missing, please contact Appear TV support.

6.1 Descrambling – Common Interface Module

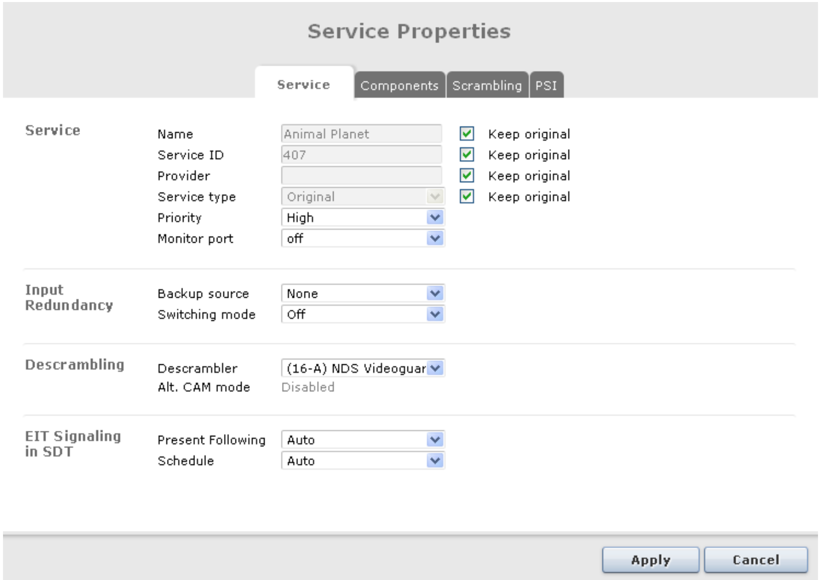
The unit is capable of descrambling a number of incoming services with the installation of a descrambler module. The descrambler module comes with two Common Interface slots and can therefore host two Conditional Access Modules (CAM's). Each Common Interface slot supports the descrambling of one or more services depending on the CAM module used.

Refer to the decoder and radio module description section for details on how services can be descrambled for these units.

6.1.1 Descrambling a Service

To descramble a service first insert the CAM into an available Common Interface slot, then insert your Smart Card into the CAM.

To assign the Common Interface slot to a service to be descrambled, double click on that service and within the **Outputs** page to display the **Service Properties** dialog



6.1.2 Transporting a Descrambled Service to Multiple Output Modules/Ports

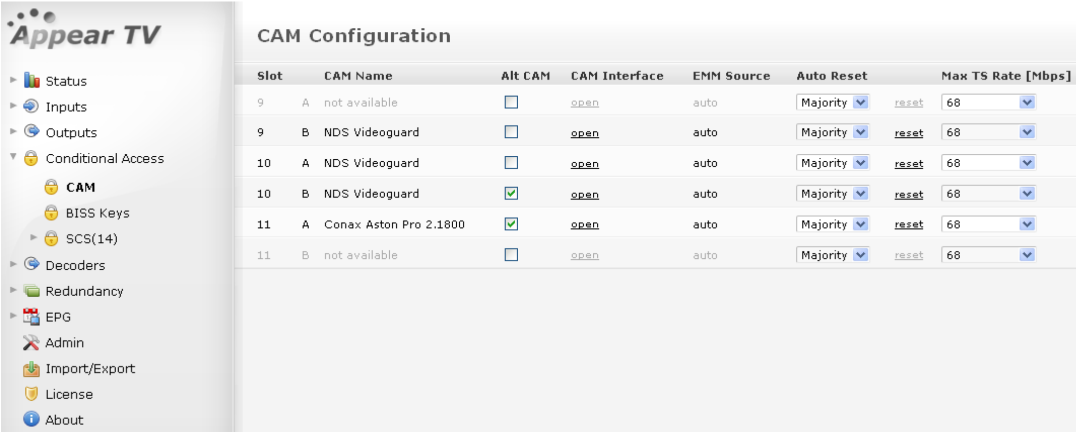
A descrambled service may be sent to up to four individual outputs. In other words, if the unit is configured with an IP output module and a QAM output module, then the descrambler module will be able to copy the descrambled service and send it to both the IP output and QAM output destinations. Alternatively, the same service can be sent to different ports on the same output module.

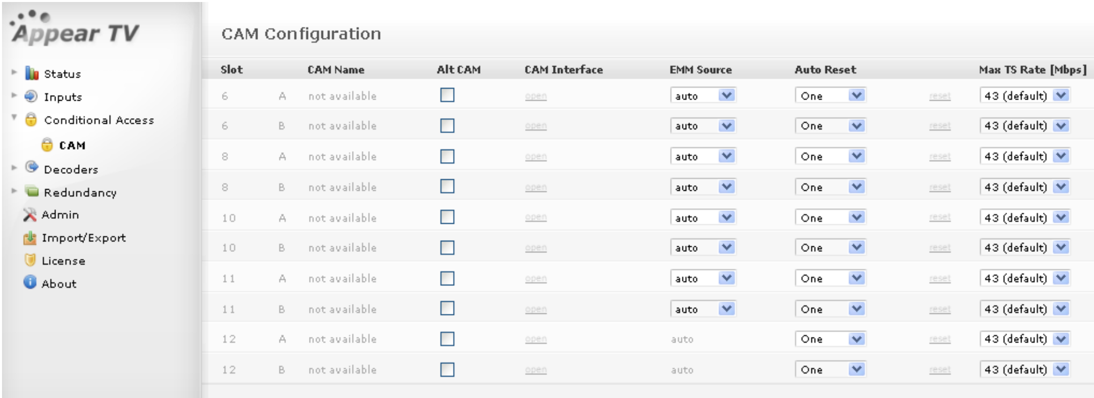
When an input service is configured to be sent to different outputs, the configuration is automatically performed by the system – as long as the same descrambler is selected. This copy function is based on per service, i.e. if a Smart Card is able to descramble up to 10 services, then the maximum number of output streams from the descrambler will be 40 (10 x 4).

6.1.3 CAM Configuration

The CAM configuration page below (accessible by selecting **Conditional Access → CAM** in the **Navigation Pane**) displays the following:

- A list of available CAM modules with its corresponding name,
- The chassis slot where the Decoder or Descrambler module is installed, and
- The CAM slot (each Decoder/Descrambler module has two CAM slots labeled A and B).





If there is no CAM module in the Decoder/Descrambler module, **CAM Name** will be displayed as **not available**.

The **Alt CAM Mode**, **CAM Interface**, **EMM Source**, **Auto Reset**, **Reset** and **Max TS Rate** are the configuration fields available in this page (Figure above).

Slot	Slot in which the Descrambler/Decoder is installed
CAM Slot	Slot in which the CAM module is installed – either slot A or B
CAM Name	Name of the CAM module
Alt CAM Mode	Activate sending of the entire input stream to the CAM without PID filtering - explained in detail in Section 6.1.4.
CAM Interface	Displays the menu defined by the CAM manufacturer – explained in detail in Section 6.1.5.
EMM Source	Displays the source of the EMM, the default value is **auto**. For the Quad Decoder, depending on the number of decoder inputs, it is possible to have more than one EMM source. In this case, a drop down box will be shown - select the appropriate source.

Auto Reset	Automatic CAM Reset – enables the CAM to reset if there are failures in the descrambling process. This helps the CAM to recover automatically without requiring the user to reset manually. **Auto Reset** provides the following options: **Off** – automatic reset is disabled; the CAM can be reset manually. **One** – if one or more services have descrambling failures, the CAM will reset. **Majority** – if more than half the services configured to be descrambled in the CAM fail, the CAM will reset. **All** – in this mode, the CAM will simply reset if all services configured in the CAM fail to be descrambled.
Man Reset	Manual CAM Reset – sometimes resetting the CAM Module is necessary, e.g. if the CAM is not responding. Click **reset** to power recycle the CAM module.
MAX TS rate [Mbps]	Maximum Transport Stream Range can be used if the rate of the transponder exceeds the default CAM input rate. The user can choose one of three values: • 43 Mbps • 58 Mbps • 68 Mbps The default value is 43; however, not all CAMs support these rates.

6.1.4 Alt CAM Mode

In a normal configuration, when an input stream is sent to the CAM, only a selection of PIDs that comprise the services being descrambled are actually transmitted, together with CA- related PIDs listed in the PSI.

In **Alt CAM Mode**, the entire input stream is sent to the CAM without PID filtering. This feature can be useful in the following scenarios:

Some CA systems do not list all the required PIDs in the PSI. Often this will involve the EMM PIDs, resulting in problems keeping the subscription updated over time. **Alt CAM Mode** can prevent this problem.

Sending all the PIDs changes the packet timing of data streaming into the CAM to more closely resemble that of the input. Testing has shown that very few CAMs require this to work reliably over time.

Not filtering PIDs sent to the CAM simplifies the input card configuration due to all input PIDs being sent. This may slightly improve response time on service changes. The effect may be marginal, but it could be of value, especially for inputs where most of the services are descrambled in the same CAM anyway.

The drawback of **Alt CAM Mode** is increased bandwidth usage from the input card(s) into the system. In most systems, this is not a significant limitation; however, it should be taken into consideration for large systems.

It is generally advised to disable **Alt CAM Mode** as this creates a higher bandwidth requirement in the unit.

We recommend you enable this option if you have problems with:

- descrambling a service
- keeping the subscription updatedreliability

6.1.5 CAM Interface

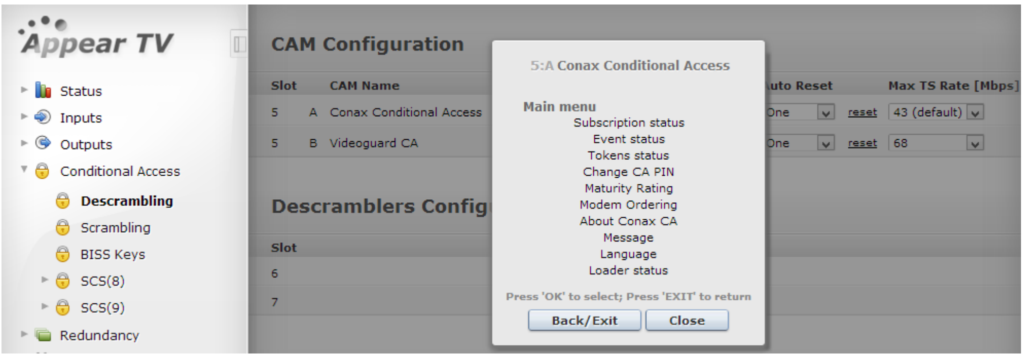
Each CAM Module has its own menu structure defined by its manufacturer to access module information, e.g. subscription status and to insert configuration data, e.g. a new PIN Code, maturity rate, and a key to descramble a service.

*The CAM Interface feature allows operators to access and interact with these menus easily via the web GUI. By clicking on **Open** under the CAM Interface column**,** a pop-up box appears over the **CAM Configuration** page. This is the CAM Interface dialog.*

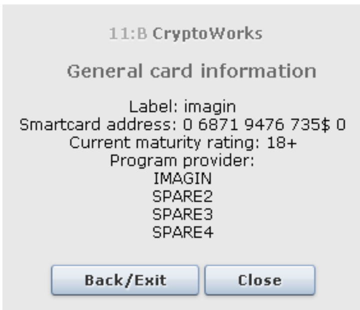
6.1.6 Navigation

Based on the figure below, the standard CAM Interface provides two buttons at the bottom and a list of clickable menu options.

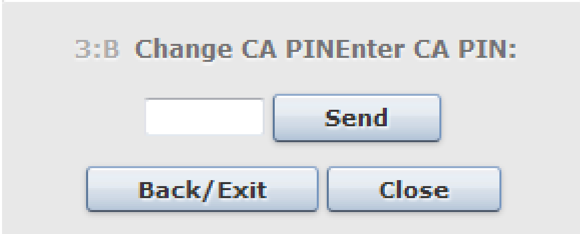
- *The **Back/Exit** button returns to the previous menu*
- *If the **Back/Exit** button is pressed on a top-level menu, the same menu screen will be displayed*
- *The **Close** button stops interaction with the CAM Module, closes the CAM Interface dialog, and displays the CAM Configuration page*



It is possible that the dialog above varies depending on the CAM manufacturer. Menus that do not allow user interaction are called Lists. Since Lists are bottom-level menu items, possible operations are either to go back to the previous menu or close the CAM Interface.



Another type of dialog is the Enquiry dialog (see below). This dialog is displayed when the CAM Module requires user input such as a PIN code. The CAM defines the maximum length of the input data and whether actual characters are displayed as the user types.



6.1.6.1 Multiple Users and CAM access

The CAM Interface supports multiple users but not multiple sessions. This means that it is possible to access the CAM Interface of the same CAM Module from different computers or browsers simultaneously, but users cannot be on different levels of the menu. For this reason the CAM Interface is refreshed every 10 seconds to request the current valid menu screen.

Due to this synchronization scheme the menu screen will change for all current users even if just one of them interacts with the CAM Interface dialog.

Multiple users interacting with a single CAM Module can lead to synchronization errors. For instance, when one user tries to access a menu that has not been refreshed after another user has interacted with it, a synchronization error will occur. This will display a ***Status*** *error. This and other errors are handled by the* ***CAM Interface*** *to provide safe and consistent interaction.*

6.1.7 *Error Handling*

When a situation results in an error and does not permit proper communication with the CAM Module, an error message will be displayed. There are different conditions that can lead to errors. The table below lists the possible error messages and their descriptions.

Error Message	Description
Error: No session. Refresh to recover communication	The user is trying to answer a menu or enquiry and the session has been closed.
Error: Session ID. Refresh to recover communication.	The user is trying to access a session that is no longer available.
Error: Status. Refresh to recover communication.	The status count value received from GUI is not the same as the one in the CAM Interface. This means that the GUI could be in another level of the menu which can lead to a non desired operation.
Error: Invalid message format.	The message parsing process is not successful.
Error: CAM No response. Refresh to recover communication.	Within a specified timeout, the CAM Interface failed to respond.
No CAM/PC Card in slot.	There is no CAM Card in the slot.
CAM not identified, or identified as non-CAM.	The PC Card is not identified, or identified as non-CAM.

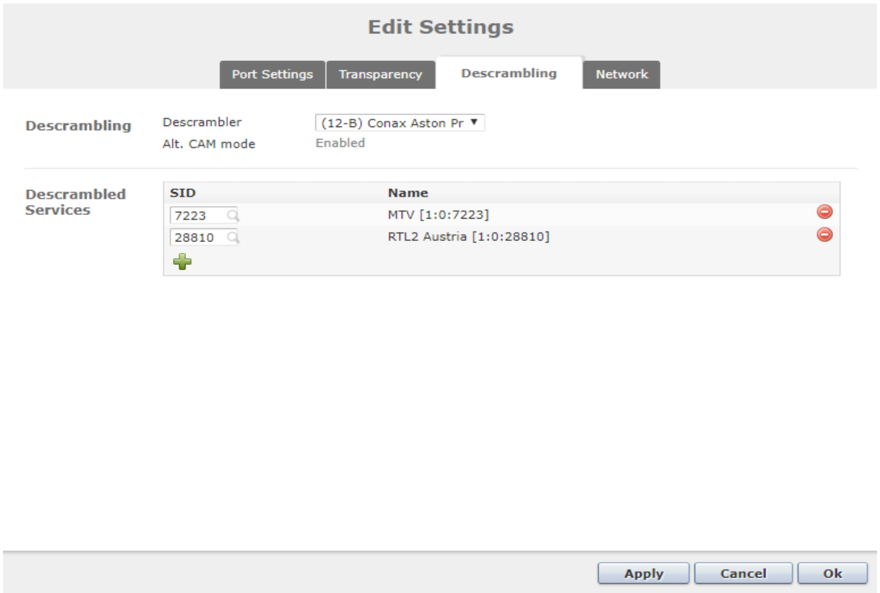
*When an error message is displayed, the **Back/Exit** button is replaced by **Refresh**. The operator can either close the CAM Interface, or try to **Refresh** the session. If a synchronization error occurs, **Refresh** is the ideal solution. Otherwise, the operator can wait for the CAM Interface to request a **Refresh** automatically.*

6.2 Generic Descrambler CI module (Descrambler gen. 2)

The Generic Descrambler CI module (Descrambler gen. 2) is a single slot processing card that supports 2 CAMs. The card is hot-swappable with previous DDM-DCI module so rest all parameters are same as section 6.1.1 to 6.1.7

Each CAM has licenses to restrict use; "number-of-descrambled-services-cam-a" and "number-of-descrambled-services-cam-b". The Descrambler supports both MUXing on the input and transparent mode, but each CAM can only be used for one mode at a time. If services are being routed through a CAM in a mux-fashion, the CAM is unable to descramble other services in transparent mode. MUXing supports descrambling in a single CAM services from any input source going to any output source.

6.2.1.1 Configuration

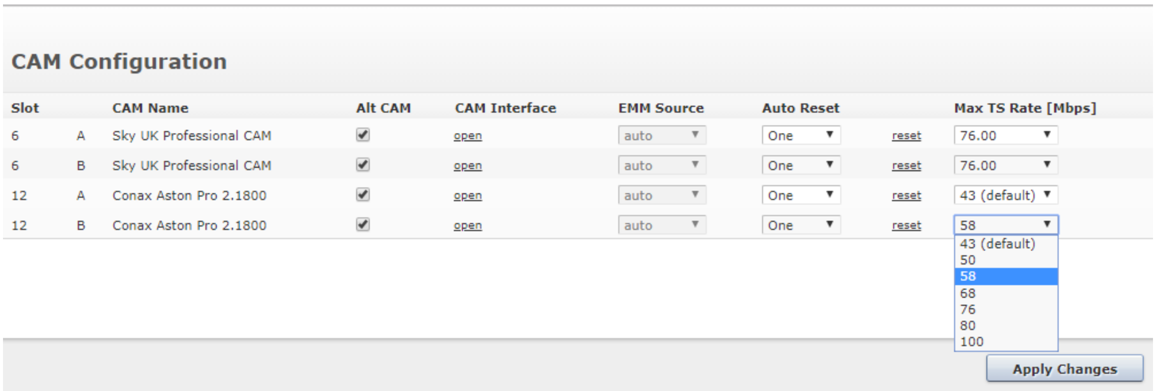


Once the Generic Descrambler CI module is inserted with CAM in the chassis then outgoing services can be descrambled by enabling it in the Descrambling tab, in the Edit Settings menu when editing an outgoing service.

The following parameters are available:

Descrambling	Slot and CI in which the Descrambler is installed either Sx:A or Sx:B
Descrambled Services	Select the services which needs to be descrambled using that CAM

The module has the capacity to descramble up to 200Mbps worth of services over 2 CAMs (100 Mbps each).



6.3 Bulk Descrambling

Appear TV's bulk descrambler is able to descramble up to 250 services per card. Actual descrambling is performed in firmware while extraction of the Control Word from the ECMs is done by integrated soft clients provided by the CA vendors. The bulk descrambler runs on a dedicated module, providing an external Ethernet port used for the communication between the soft client and the CA server for exchange of access criteria.

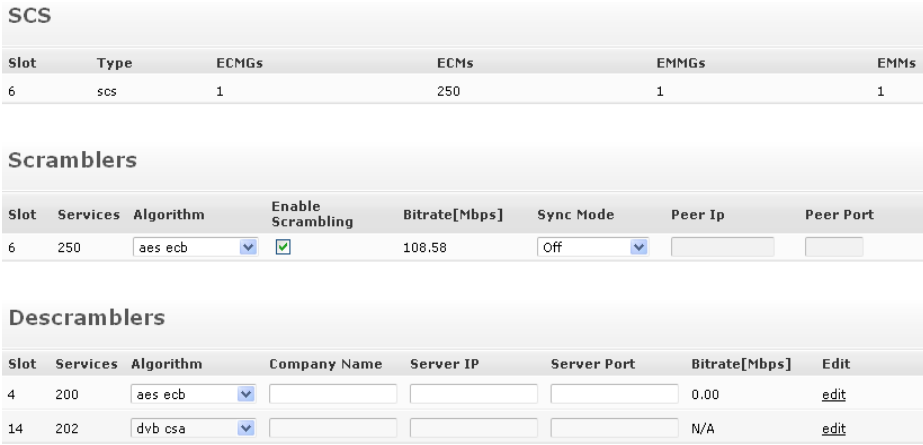
The maximum number of ECMs that can be descrambled depends on the processing power requirement of the CA client.

Currently the descrambler algorithms supported are: DVB-CSA or AES-ECB; but not both simultaneously.

Below are the CA systems integrated with the bulk descrambler module:

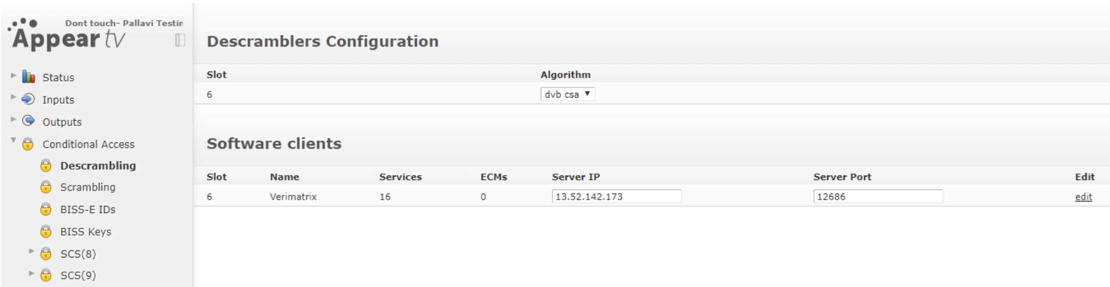
CA System	Number of Services Supported
BISS	250 services
Latens	250 services
Verimatrix	250 services

Preparing the bulk descrambler module to descramble services requires some initial configuration to establish a link to the CA vendor's server. To be able to view the GUI and enter necessary parameters, the correct licenses must be installed as the bulk descrambler functionality is licensed together with the number of services.



6.3.1 Verimatrix Configuration

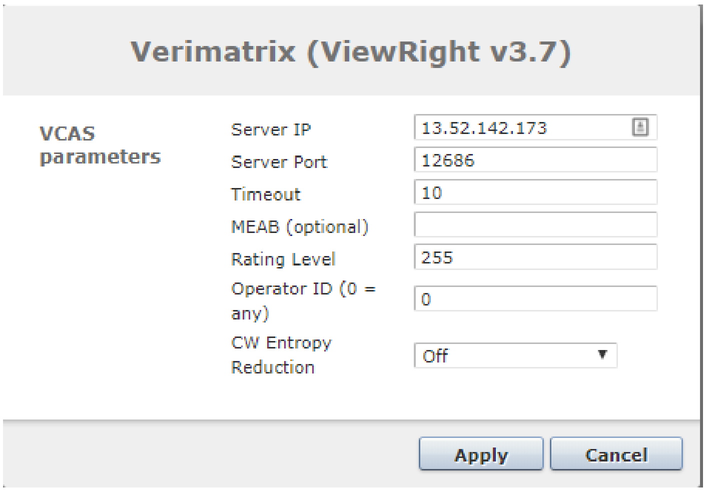
In order to access to Verimatrix Bulk Descrambler configuration, click on **Conditional Access → Descrambling**, and the following menu will be presented:



The following parameters are available:

Slot	Slot in which the descrambler module is installed
Services	Number of services currently active
Algorithm	Descrambling is performed in firmware. Depending on the firmware installed, different algorithms will be available. Select an algorithm after installing a descrambler.
Company Name	A unique key that will be exchanged with the CA system (provided by your CA vendor)
Server IP	IP address of the CA vendor's server
Server Port	CA vendor port to be used
Bitrate [Mbps]	Total bitrate passing through the descrambler
Edit	Bring up the dialog below

By clicking on "edit", the user will access to the Verimatrix VCAS' specific settings, as shown in the picture below:



Server IP	IP address for the CAS server
Server Port	IP port for the CAS server
Timeout	Duration of timeout for connecting to the CAS server.
MEAB	Enter value
Rating Level	Enter the value for Rating Level (0 – 255)
Operator ID	Set the Operator ID value. A value of '0' will indicate that any Operator ID is accepted
CW Entropy Reduction	Enable or Disable Entropy Reduction (CSA mode only)

Once the bulk descrambler has been initialized, outgoing services can be descrambled in the same manner as the standard CAM based solutions – by selecting the descrambler module to be used for descrambling in the **Service Properties** dialog (on the output configuration page). A similar procedure is necessary for Radio and decoder modules too.

Software version 3.38+ supports entropy reduction of the CW received by the descrambler (CSA mode only). If the service is scrambled with a 48-bit CW, the descrambler is able to descramble both with a 64-bit key (that is reduced to 48-bit) and 48-bit key (that remain the same). But the user will not be able to descramble a service where the service is scrambled with 64-bit CW, since the CW then will be reduced, and there will be a mismatch between scrambled TS and CW. CW entropy reduction is disabled by default, and not required for normal operation where TS scrambling and CW match.

6.3.1.1 Verimatrix ECM rating level

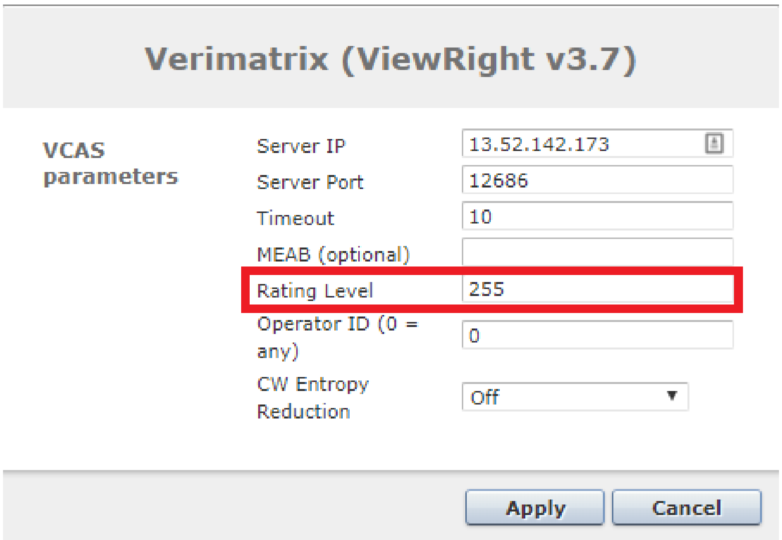
The Verimatrix Bulk Descrambler can stop descrambling if the ECM received has a rating level that is higher than allowed for the descrambler.

The rating level is a value between 0-255.

If rating level is enabled the library will monitor the ECM and stop descrambling if the rating level in the ECM is higher than the one set for the descrambler.

6.3.1.2 Setting descrambler rating level

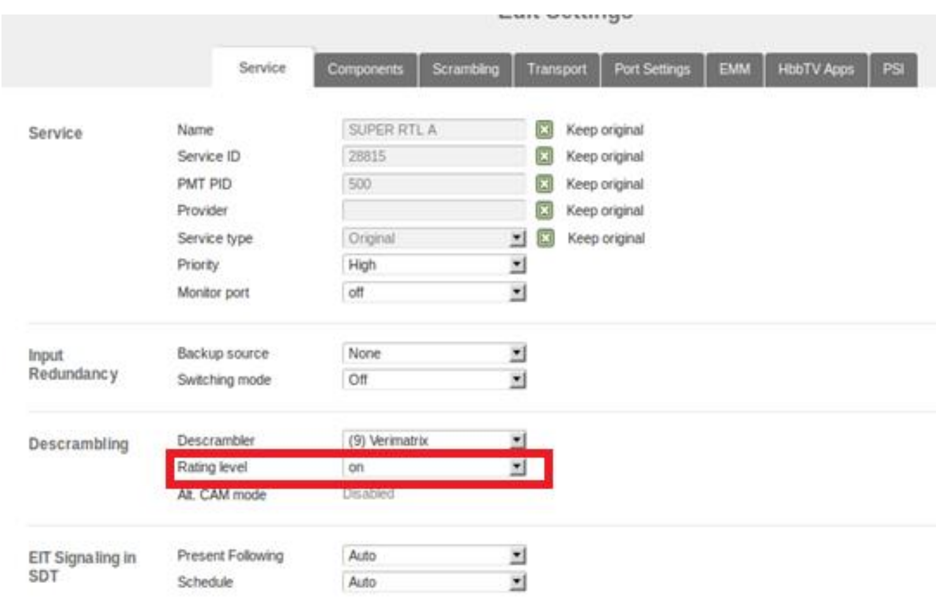
For each descrambler you can set a global rating level that all services must follow (if rating level is enabled). The descrambler rating level is set in **Conditional access-> Descrambling** in the edit menu for the Verimatrix bulk descrambler.



By default, this value is 255, which means it will descramble all services.

6.3.1.3 Enabling rating level for a certain output service

Rating level can be turn on when descrambling with Verimatrix is selected in the output GUI. This means that the use of rating level can be turn on per service.



6.3.1.4 Alarm: Stopped descrambling due to rating level

When the rating level in the ECM goes above the value set in the descrambler, the descrambling will stop and an alarm will be raised

6.3.1.5 Monitoring alarm: ECM rating change

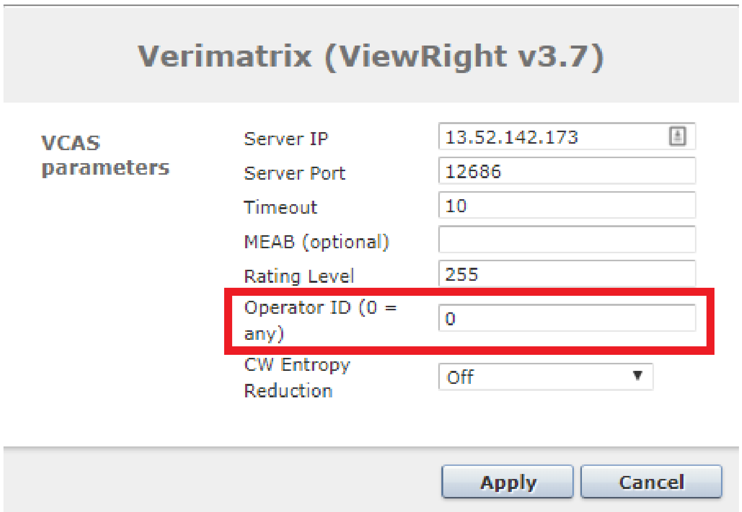
User can enable a monitoring alarm to detect changes in ECM rating level in the **Status→Monitoring** menu.

If the ECM rating level is below the descrambler rating level, the alarm will provide the value of the ECM rating level. If the ECM rating level is above the descrambler rating level, the alarm will only notify that the rating has gone above the descrambler rating level.

6.3.1.6 ECM Operator ID Filtering

Operator ID filtering is available for **Verimatrix bulk descrambler.**

The edit menu for the **Verimatrix descrambler** have an Operator ID input.



- Define Operator ID in the GUI:
  - Value: 0-255, 0 means any Operator ID.
- Verimatrix Bulk descrambler extracts Operator ID from ECM and compare against configured value:
  - It rejects ECMs if Operator ID is set (not 0) and is different to the value configured
  - It accepts ECMs that match the Operator ID indicated in the configuration, using these ECMs for descrambling
  - Verimatrix descrambler will raise an alarm if no ECM has been found with the configured operator id: "Warning: Operator ID field not present in incoming ECM's.

	Extraction of ECM Operator ID only guaranteed as long as Verimatrix doesn't change their ECM format

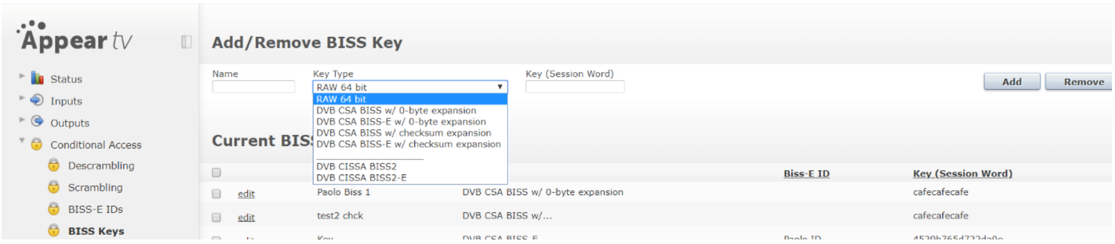
6.3.2 BISS Scrambling and Descrambling

6.3.2.1 Key Handling

The unit supports BISS and BISS2 scrambling and descrambling (Mode 1 and Mode E), which is the simplest form of fixed key scrambling available. The scrambling solution is based on the standard scrambler card, while the descrambling is based on the bulk descrambler card.

	BISS descrambling can also be done via a CAM based system where the key is inserted using the CAM interface. Detailed explanation on BISS descrambling with CAM systems is beyond the scope of this manual.

The key handling procedure is identical for both scrambling and descrambling. A key can be defined and associated with a name, which is the reference used for the stream's configuration.



The figure above illustrates a GUI with one existing key named "test2 chck". The "test2 chck" key may be used both for descrambling and scrambling.

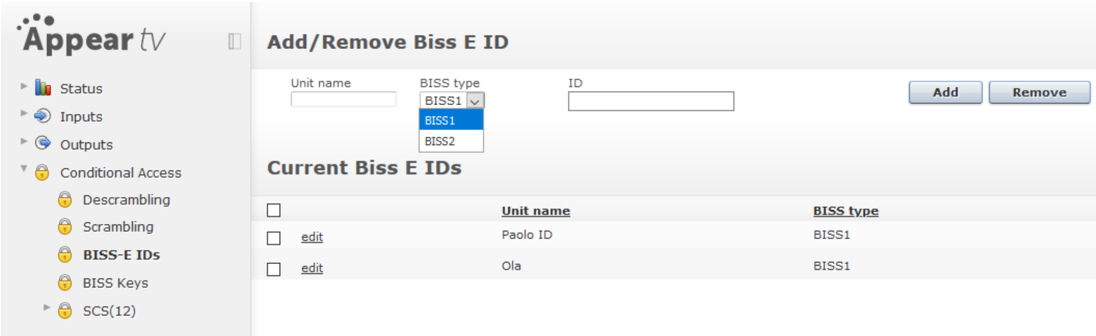
The following parameters are available:

Name	Name for the key
Key Type	Select one of the following: • RAW 64 Bit • DVB CSA BISS w/o-byte expansion • DVB CSA BISS-E w/o-byte expansion • DVB CSA BISS w/ checksum expansion • DVB CSA BISS-E w/ checksum expansion • DVB CISSA BISS2 • DVB CISSA BISS2-E
Key (Session Word)	Control word used for scrambling or descrambling

In BISS Mode E the key (Session Word) is protected by encrypting it using a key ID. An encrypted key is generated by selecting DCB CSA BISS-E as key type, and using the **Encode** mode, and selecting the BISS-E Unit Key. The resulting encrypted key is displayed to the user in the GUI. The same procedure is used in order to retrieve a clear key from an encrypted BISS-E Unit Key by selecting the **Decode** mode.

6.3.2.2 BISS-E IDs

The page for BISS-E IDs is used to add in keys which can be used to encode/decode BISS-E keys. Please note, that once these keys have been added, it is not possible to view/edit the original key.

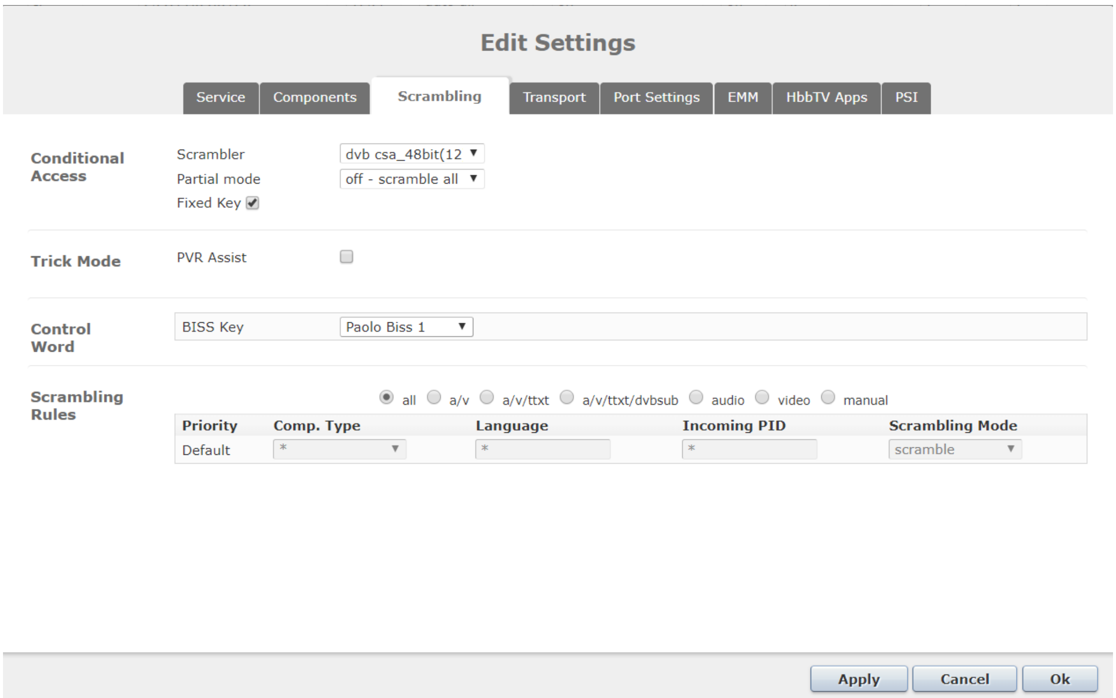


The following parameters are available:

Unit name	Name for the Unit
BISS Type	BISS1 or BISS2
ID	Specify the Key for the unit

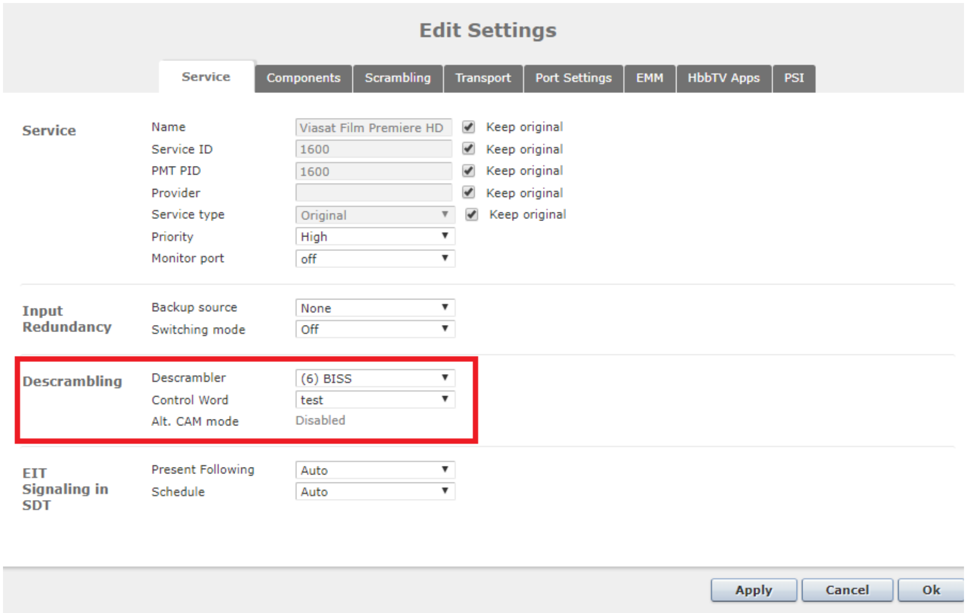
6.3.2.3 Setting up a BISS Scrambler

To configure an outgoing stream with the defined BISS or BISS2 key, select a **dvb csa** Scrambler module from the drop-down menu, and tick the "Fixed Key" checkbox. That will show a new section in the "Scrambling" tab called "Control Word", where The BISS Key dropdown box will list all previously defined keys. Select the desired BISS Key and click "Apply" to enable fixed-key encryption. BISS or BISS2 will be used according to the key that has been selected in the drop-down menu.



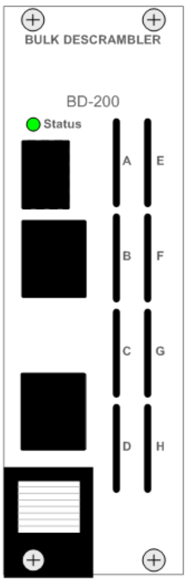
6.3.2.4 Setting up a BISS Descrambler

To descramble an outgoing stream with the defined BISS key, select the appropriate descrambler card and key to be used in the output service configuration page. If using a Bulk Descrambler module, ensure that it is running in DVB-CSA mode (BISS not available for AES Bulk Descrambler). If that is the case, the "Descrambler" drop-down menu in the output settings of an outgoing stream will presented a "BISS" option, that shall be selected. Then choose the corresponding fixed-key in the "Control Word" drop-down menu and click "Apply" to start BISS or BISS2 descrambling.



6.3.3 SIM bulk Descrambler

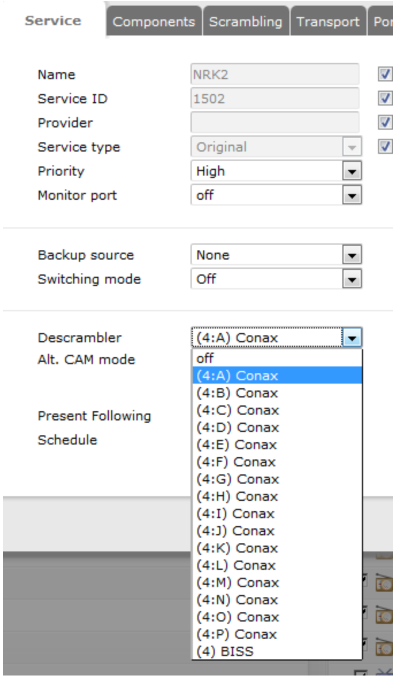
The SIM Bulk Descrambler Module has the ability to add up to 16 SIM form smart cards, which are used in conjunction with a supported CA system in order to descramble services. These SIM cards are able to be loaded on both the front of the module (ports A – H), and on the module itself (ports I – P). In order to access the slots on the module, this must be removed from the chassis.



Currently, the SIM Bulk Descrambler is compatible with the following CA Systems:

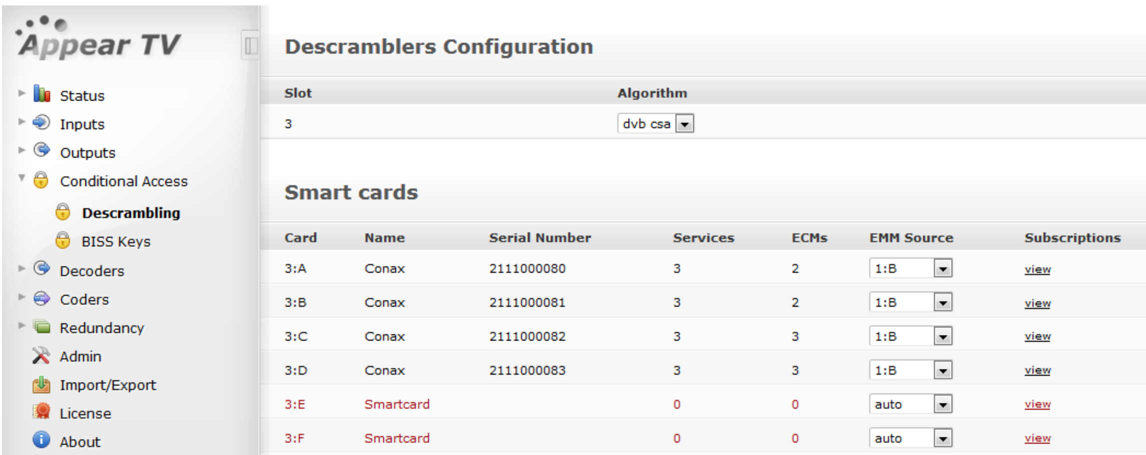
- Conax (DVB-CSA)
- Crypto Guard

When descrambling a service, the selection of the SIM card is done on the output services **Service** tab, in a similar way as for CAM descrambling.



Configuration and Status of the SIM cards is available on the **Conditional Access->Descrambling** page. This will display a list of valid SIM cards and their serial numbers.

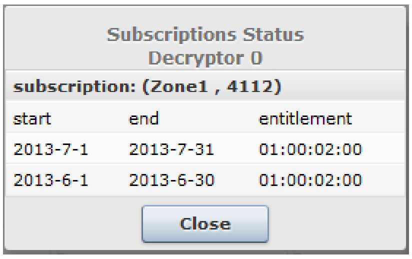
The choice of the EMM source is done in the **Descrambling** page of the GUI. In this page is also reported the number of ECMs assigned to each smart card.



The following parameters are available:

Card	Slot number for the card
Name	Name of the card i.e.: Conax

Serial Number	Serial number of the Smart card
Services	Number of services used by that Smart card.
ECMs	Number of ECMs used by that Smart card.
EMM Source	Specify Selected valid EMM input source
Subscriptions	Status of Subscriptions for the card



6.4 Scrambling

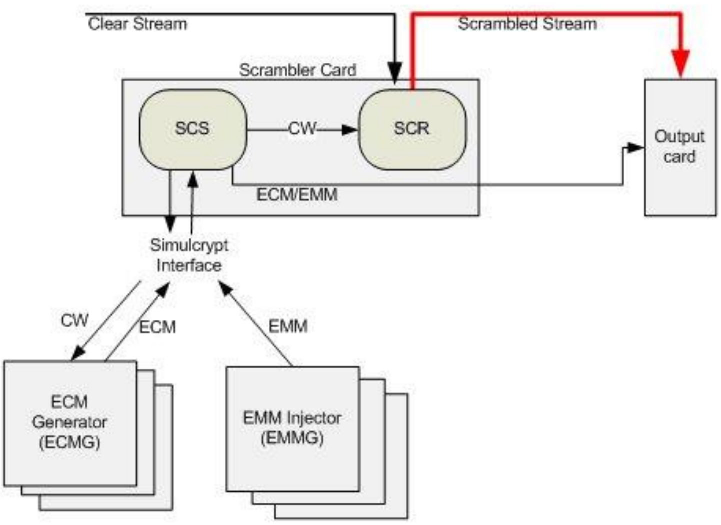
This section provides a brief overview on how scrambling is performed within the unit. It introduces the different components required and their purpose and explains how to setup the scrambler card to establish ECM and EMM channels as well as their actual streams.

For information on how to conduct scrambling, add an EMM to an output transport stream, etc. refer to Chapter 8.3.

The scrambler module is composed of two components:

- SCS – a software component responsible for managing the interfaces used by external ECMG, EMMI, and EIS services.
- SCR – a hardware component responsible for encryption (DVB-CSA or AES) of the services.

The functional diagram below shows these components and their relations with the rest of the system.



The SCS module is the master of the scrambling system. It is aware of the ECMG and the scrambler module. Upon configuration, the SCS card generates a CW, sends it to the ECMG, which returns the ECM. The SCS then sends the CW to the hardware component scrambling the live content and transfers the ECM to the correct output card for playout.

Before it is possible to define an output stream with the scrambling properties it is necessary to define the ECM generator, as the SCS needs to know where to contact the encryption system. Next step is to define an ECM. The ECM definition associates a CW id and access criteria. The output can now be defined and scrambled. When configuring the output to be scrambled the ECM selection list implicitly represents the CW and access criteria while the scrambler indicates the scrambler card.

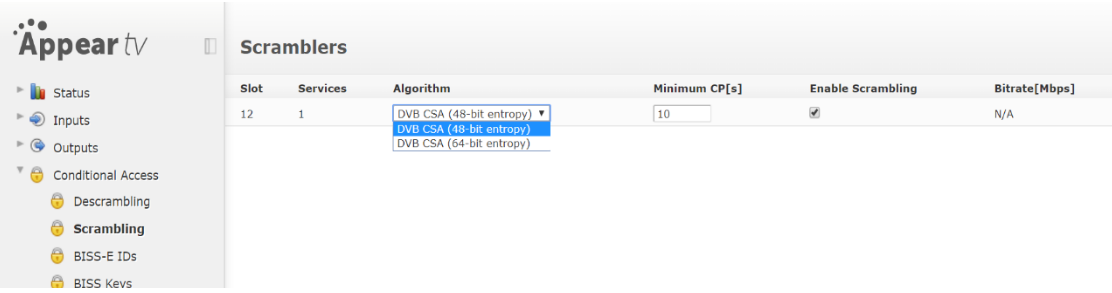
6.4.1 Scrambler Module Configuration

The scrambler module runs both the SCS functionality and the scrambler functionality on one single card. The Scrambler supports both the DVB-CSA and AES scrambling algorithms – but only one at a time

DVB-CSA supports the 64-bit and 48-bit entropy algorithm. In order to enable Scrambling algorithm, user needs to choose either "DVB CSA (48-bit Entropy)" or "DVB CSA (64-bit entropy)".

The scrambler card supports up to 250 scrambled services, with a maximum total bitrate of 850Mbps.

An overview of the scramblers present in the unit is available in the **Conditional Access** node in the **Navigation Tree**.



This configuration page gives a general overview of how many ECMs and EMMs have been configured as well as providing a dialog to select which scrambling algorithm to run on the card (available algorithms depend on the licenses and SW version installed). The options provided here are based on the information reported by the scrambler card during startup.

Slot	Slot number for the card
Services	Number of scrambled services
Algorithm	Algorithm used for scrambling services
Minimum CP[s]	Value of minimum CP
Enable Scrambling	Enables scrambling on all the services. When un checked then disables scrambling on all the services.
Bitrate [Mbps]	Bitrate used by scrambled services

6.4.1.1 Configurable crypto period on the scrambler

It is possible to configure a user definable minimum crypto period (CP) per scrambler card, under Conditional Access ⟶ Scrambling. The minimum crypto period default is 10 seconds, which is the minimum crypto period supported, but can be set as high as 6553 seconds.

If the nominal CP duration is changed as a consequence of a user changing the minimum CP, the change takes effect the next CP. Thus, the current CP is not interrupted (neither shortened nor lengthened in time).

6.4.1.2 Selective Scrambling/Partial Scrambling

The scrambler card supports both selective and partial scrambling, implying that parts of the content are sent in clear. Selection is done per service and is enabled during the configuration of the output stream. Selective scrambling is only available for selected CA systems and requires a license.

6.4.1.3 Configuring an ECM Generator Channel

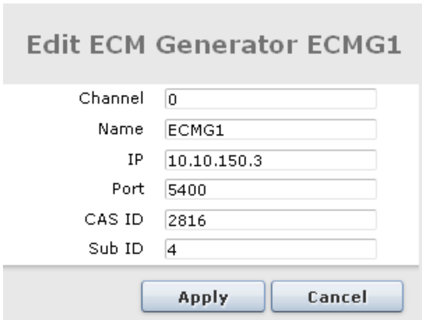
A connection to an ECM generator is defined in the **ECMG** node located under the **Conditional Access → SCS** node in the **Navigation Tree**. The connection to an ECMG establishes a channel over which ECMs will be sent.

The following information is displayed:

Input	Logical port representing the connection to the ECMG – assigned automatically. This number is used internally as well as for generating alarms.
Channel	The SimulCrypt Channel ID used for the CA system
Name	For reference in the GUI only
IP	IP address of the ECMG
Port	TCP port of the ECMG
CAS ID	CA vendor specific ID
Sub ID	CA vendor specific sub ID
State	Status of ECMG connection, either **OPEN** or **NOT CONNECTED**.

To change an, ECMG channel connection click on the existing ECMG entry and enter the new configuration.

It is possible to have several ECMG connections simultaneously but the CAS ID has to be uniquely defined. If the same CAS ID is used, a real SimulCrypt will not work as the CA Descriptor in the PMT will be identical for both ECMs. In this case, private data must be used by STBs to distinguish ECMs.



Configuring the CryptoLITE embedded ECM Generator

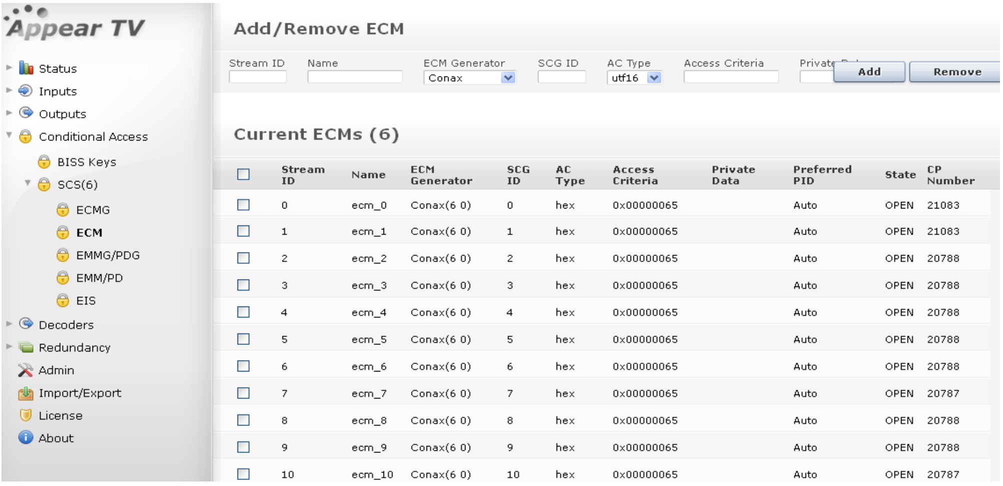
CryptoLITE is an embedded ECM Generator running on the scrambler card. To establish a channel connection to CryptoLITE, use the following mandatory parameters:

- IP: 127.0.0.1
- Port: 5555
- CAS ID: 19178

The ECMG will accept one channel only; up to 250 ECM streams are supported. When adding an ECM, the **Access Criteria** field may be left empty. However, it is possible to enter a fixed 8-byte (16 HEX characters) user specified scrambling key in the **Access Criteria** field.

6.4.1.4 Configuring an ECM Stream

An ECM is defined from the **ECM** node in the **Navigation Tree**. The ECM entry links a CW and Access criteria to an ECM Generator.



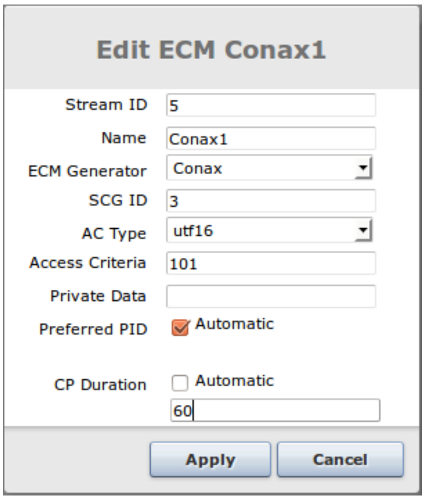
The following information is displayed:

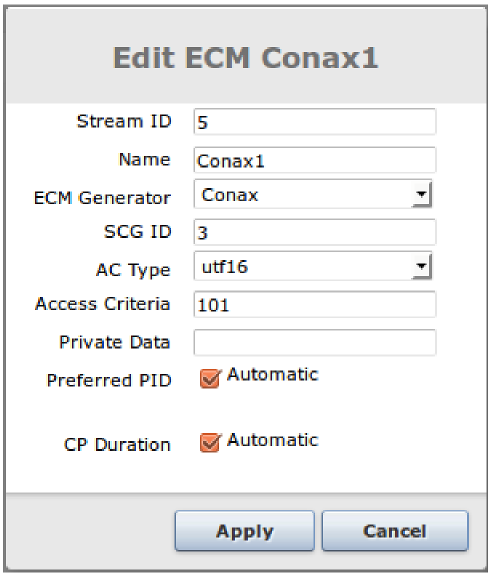
Stream ID	The SimulCrypt Stream ID used towards the CA system. Its value is also set to the SimulCrypt EcmId.
Name	For reference in the GUI only
ECM Generator	Links the ECM to the predefined ECMG
SCG ID	CW selection; all ECMs with the same SCG id will share the same CW.
AC Type	Access Criteria type – refers to the data type used over the SimulCrypt protocol when the access criteria are transferred. Available types are: UTF16, INT32, or HEX.
Access Criteria	Specified in decimal or HEX (use 0x prefix)
Private Data	Private descriptor data added to the ca_descriptor in the PMT; enter in HEX using the 0x prefix.
PID	Preferred ECM PID value transmitted at the output module; the maximum value is 8191.
State	OPEN or CLOSE
CP Number	This is a reference number for both CAS and scrambler. It represents the number of exchanges between the ECMG and the scrambler; the value is either Automatic or configurable.

If multiple ECMG connections have been defined, the same SCG ID may be used for two ECMs as long as they are connected to different ECMGs.

i	At this point, the ECM stream is defined and the CA system as well as the SCS module can begin to exchange CW and ECMs. However, the ECM is still not associated to any output. Refer to the Output Configuration chapter for details on how to associate ECMs to outputs.

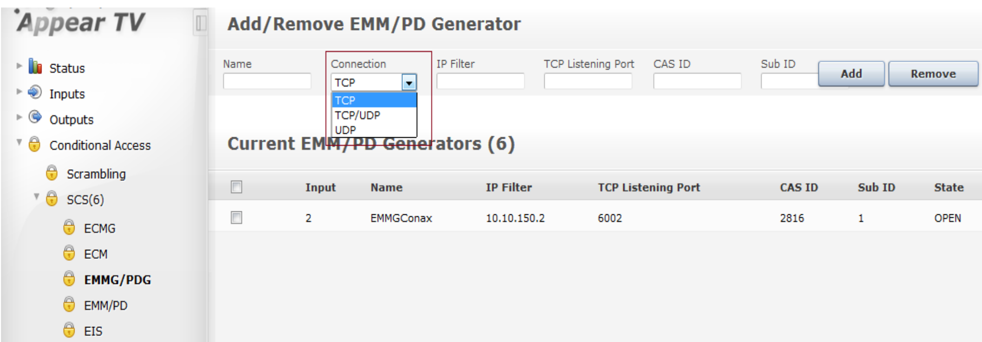
To change an, ECM configuration click on the existing ECM entry and enter the new configuration.





6.4.1.5 Configuring an EMM Generator (EMMG) Channel

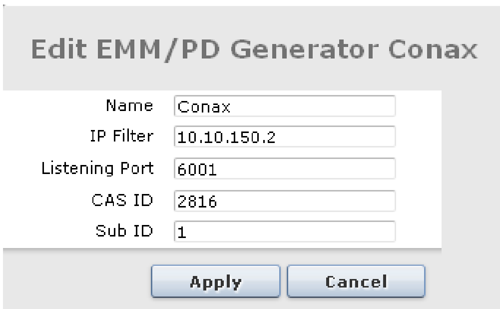
To establish a connection to an EMM Generator (or Private Data Generator), go to **Scrambler → SCS → EMMG/PDG** node in the **Navigation Tree**, enter appropriate values and click **Add**.



The following information is displayed:

Input	Logical port representing the connection to the EMMG – assigned automatically. This number is used internally as well as for generating alarms.
Name	For reference in the GUI only
Connection	EMM transfer connection can be either of the below -TCP -TCP/UDP -UDP
IP Filter	IP address of the EMMG to be connected to. If the value 0.0.0.0 is used, the unit will accept a connection from any IP address. When multiple sources are trying to connect, it is first come first serve.
Listening Port	TCP port for the EMMG to connect to
CAS ID	CA vendor specific ID
Sub ID	CA vendor specific sub ID
State	Status of the EMMG/PDG connection, either OPEN or NOT CONNECTED.

To change an, EMMG channel connection, click on the existing EMMG entry and enter the new configuration.



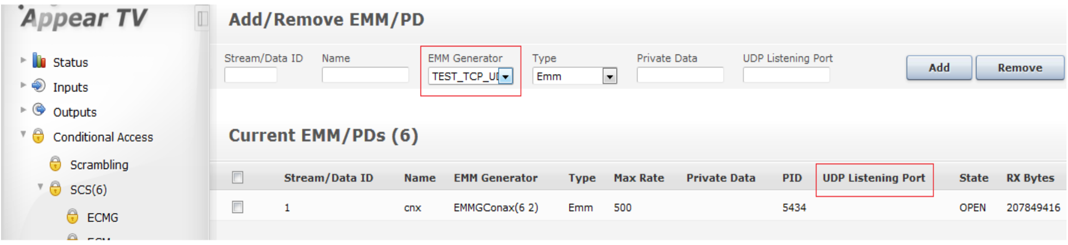
EMM/PD Bandwidth

During the EMM/PD stream configuration the SCS and the EMM/PD generator will negotiate the maximum bandwidth allowed for a given stream. This bandwidth has a default value of 100kbits/s and can be also set explicitly from the GUI. **The maximum total bandwidth available per card is 3 Mbits/s** for these streams.

In the case where the CA system is transmitting more data than the SCS card can handle, the CA system will indirectly be notified as the flow control mechanism in the TCP stack will notify the transmitter; hence the CA system can take appropriate measures to avoid overflow.

6.4.1.6 Configuring an EMM/PD Stream

An EMM/PD is defined from the **EMM/PD** node in the **Navigation Tree**.

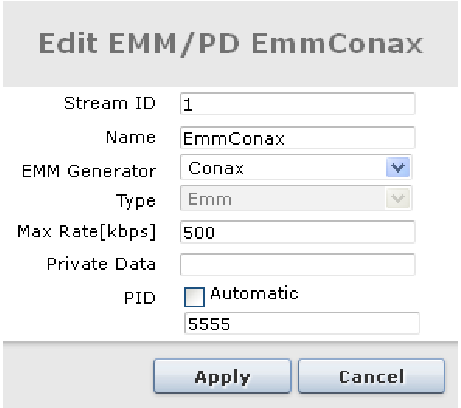


The following information is displayed:

Stream ID	The SimulCrypt Stream ID used towards the CA system. Its value is also set to the SimulCrypt DataId.
Name	For reference in the GUI only
EMM Generator	Links the EMM to the predefined EMMG
Type	Expected type of generator – EMM or PD
Max Rate	Maximum bandwidth allowed for this stream
Private Data	Private descriptor data added to the ca_descriptor in the CAT; enter in HEX using the 0x prefix.
PID	Preferred ECM PID value transmitted at the output module. The default PID value is 7500 (unless manually assigned) while the maximum PID value is 8191. If several ECMs are used in an MPTS output, the ECM values will be incremented: 7501, 7502, … etc.
Listening Port	For EMM transfer over UDP configured, then the UDP port must be defined when configuring the actual EMM
State	OPEN or CLOSE
RX Bytes	The total number of bytes received by the generator

At this point, the EMM/PD stream is defined and the CA system is able to push content to the SCS module. However, the EMM/PD is still not associated to any output. Refer to the Output Configuration chapter for details on how to associate EMMs to outputs.

To change an, EMM/PD configuration click on the existing EMM/PD entry and enter the new configuration.



6.4.1.7 Support for Multiple CA Systems (Simulcrypt)

The scrambling solution supports four CA systems simultaneously. No particular configuration is required for this. Simply define the appropriate ECMGs, ECMs, EMMGs and EMM connections required. The system to be used for actual scrambling is defined as part of the output configuration process.

When configuring services that are to contain information for multiple CA systems, the following must be done:

- The corresponding ECMs for each service / CA system must have identical SCG ID values
- All ECMs must be assigned to the service
- If applicable, valid EMMs must be added to the output for each CA system

6.4.1.8 Configuring an EIS service Channel

The Event Information Scheduling (EIS) interface is a scheduling interface for associating ECMs to outputs. The configuration of the EIS is similar to setting up an ECMG/EMMG connection.

The EIS interface provides the following functions.

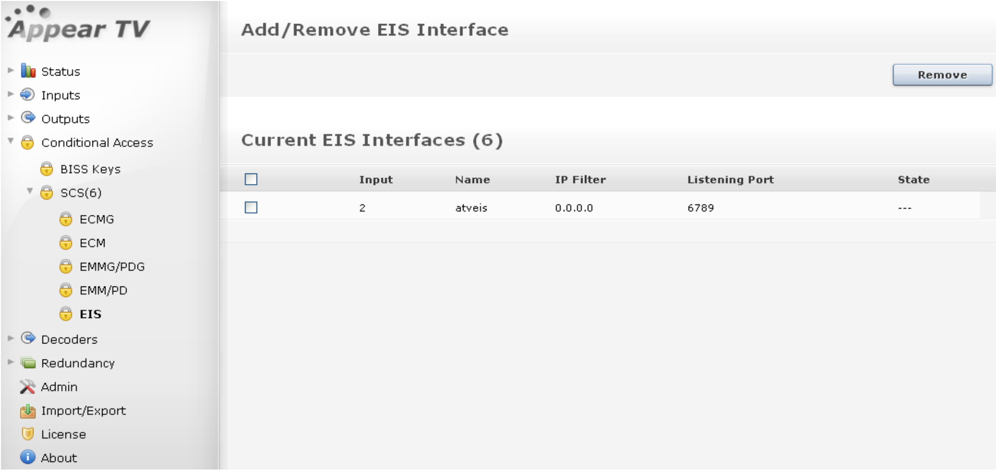
- Create a new ECM
- Modify an ECM's access criteria
- Remove an existing ECM

Control scrambling of an output service. The output triplet (Net ID, TS ID, and SID) is used as the output service identifier.

As the EIS is not able to create the ECMG channel configuration, this needs to be done from the web GUI before the EIS can be used.

Based on the DVB Simulcrypt standard, only **one** EIS is permitted per chassis.

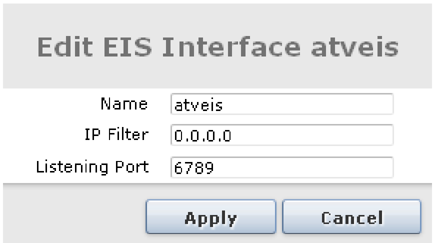
To establish a connection to an EIS service, go to **Scrambler → SCS → EIS** node in the **Navigation Tree**, enter appropriate values and click **Add**.



The following information is displayed:

Input	Logical port representing the connection to the EMMG – assigned automatically. This number is used internally as well as for generating alarms.
Name	For reference in the GUI only
IP Filter	IP address of the EIS service to be connected to
Listening Port	TCP port for the EIS to connect to
State	OPEN or CLOSE

To change an, EIS connection, click on the existing EIS entry and enter the new configuration.



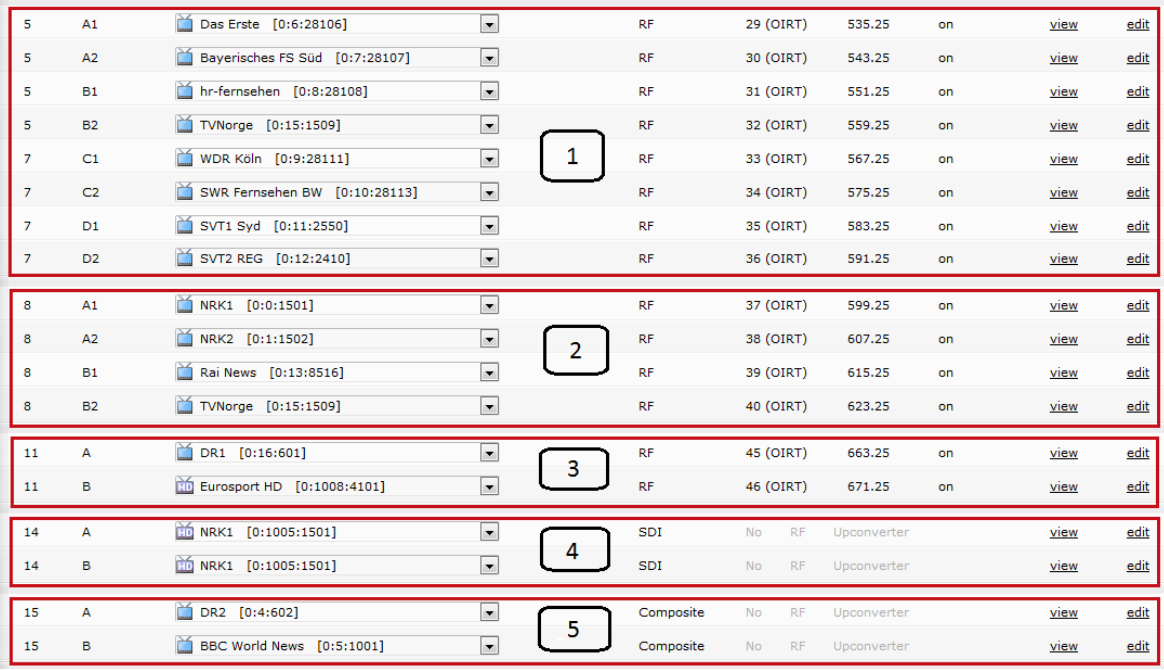
Once the service is connected, the EIS can schedule ECMs to the outputs.

7 Decoder Output Configuration

The decoder modules are configured using the **Decoders** view in the **Navigation Pane**. All available decoder modules will be listed based on their slot position.

The chassis can hold multiple dual decoder modules. Follow the procedure below to configure the modules.

Open the **Decoders** view in the **Navigation Pane** and the following will be displayed.



5	A1	Das Erste [0:6:28106]		RF	29 (OIRT)	535.25	on	view	edit
5	A2	Bayerisches FS Süd [0:7:28107]		RF	30 (OIRT)	543.25	on	view	edit
5	B1	hr-fernsehen [0:8:28108]		RF	31 (OIRT)	551.25	on	view	edit
5	B2	TVNorge [0:15:1509]		RF	32 (OIRT)	559.25	on	view	edit
7	C1	WDR Köln [0:9:28111]	1	RF	33 (OIRT)	567.25	on	view	edit
7	C2	SWR Fernsehen BW [0:10:28113]		RF	34 (OIRT)	575.25	on	view	edit
7	D1	SVT1 Syd [0:11:2550]		RF	35 (OIRT)	583.25	on	view	edit
7	D2	SVT2 REG [0:12:2410]		RF	36 (OIRT)	591.25	on	view	edit
8	A1	NRK1 [0:0:1501]		RF	37 (OIRT)	599.25	on	view	edit
8	A2	NRK2 [0:1:1502]	2	RF	38 (OIRT)	607.25	on	view	edit
8	B1	Rai News [0:13:8516]		RF	39 (OIRT)	615.25	on	view	edit
8	B2	TVNorge [0:15:1509]		RF	40 (OIRT)	623.25	on	view	edit
11	A	DR1 [0:16:601]	3	RF	45 (OIRT)	663.25	on	view	edit
11	B	Eurosport HD [0:1008:4101]		RF	46 (OIRT)	671.25	on	view	edit
14	A	NRK1 [0:1005:1501]	4	SDI	No	RF	Upconverter	view	edit
14	B	NRK1 [0:1005:1501]		SDI	No	RF	Upconverter	view	edit
15	A	DR2 [0:4:602]	5	Composite	No	RF	Upconverter	view	edit
15	B	BBC World News [0:5:1001]		Composite	No	RF	Upconverter	view	edit

The different types of decoders are displayed in a different way:

1. 8 channel quad decoders with TV modulators (the TV modulator is in slot 7)
2. 4 channel quad decoders with TV modulators
3. Decoders with HP RF modulation and stereo
4. Decoders with SDI outputs
5. Decoder with Composite output

The Decoders page contains the following information:

Slot	Slot position in the chassis
Output	Depending on the number of channels in the decoder, the channels are identified in the following style: • Channel **A** and **B** for decoders with <u>two</u> channels • Channels **A**, **B**, **C**, and **D** for decoders with <u>four</u> channels • Channels **A1**, **A2**, **B1**, **B2**, **C1**, **C2**, **D1**, and **D2** for decoders with <u>eight</u> channels
Input Source	Assigns a service to the output. The service list is automatically generated from the services available on the input modules. For an MPTS input stream, all available services will be listed. If Service Definition Tables (SDTs) are available in input streams, the service list will consist of service names together with the Service ID (SID) and a local input ID. Whenever the SDT table is not present, the

	services will be listed as service 1, service 2, etc.
RF Ch	Assigned RF channel with the frequency plan used displayed in brackets.
RF Freq	Assigned frequency in MHz
RF Enable	Shows if the channel is enabled or not; if it is not enabled the RF carrier is switched off.
Status	Displays decoder status information. Refer to 7.1.1 for detailed information on the parameters displayed.
Edit	Detailed configuration of the output

To assign a service to an output, select it from the drop down list in the **Service Name** column. Information such as the slot, input port, and service PID, for the corresponding input module can be found just after the service name itself; the decoder's type can be found in the **About** node.

The services will automatically be assigned to the output immediately after they have been selected.

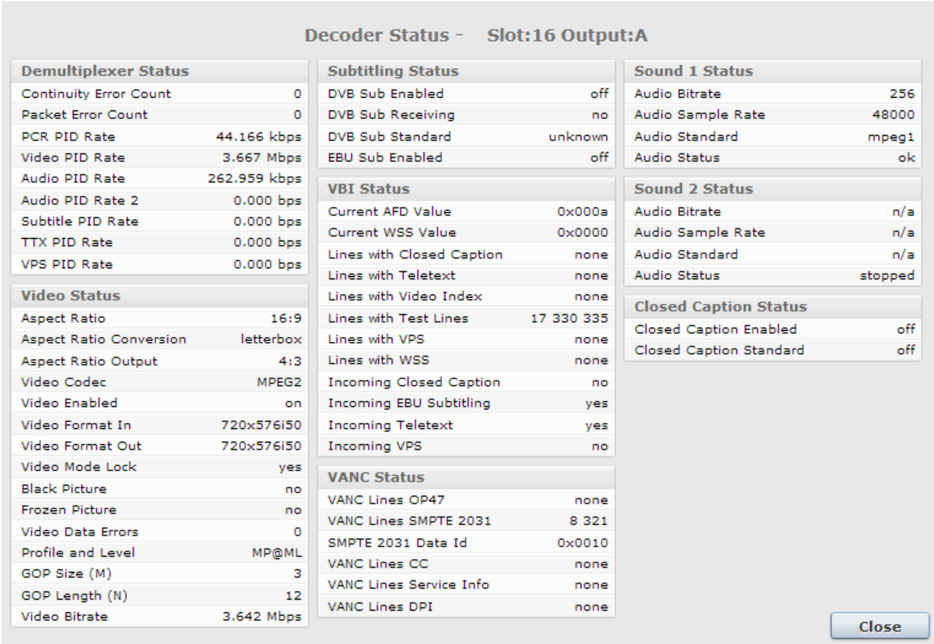
To configure audio language, subtitling, etc, click Edit for the service/channel.

To view existing configuration for a particular decoder, click **view** in the **Status** column.

i	The RF parameters above will only be visible in the GUI if the decoder card has an RF option. Otherwise, they will not be listed.

7.1.1 Decoder Status

The **Decoder Status** dialog displays all parameters and their respective values for a particular decoder channel. This dialog can be accessed simply by clicking **view** on a particular channel.


Decoder Status - Slot:16 Output:A

Demultiplexer Status	
Continuity Error Count	0
Packet Error Count	0
PCR PID Rate	44.166 kbps
Video PID Rate	3.667 Mbps
Audio PID Rate	262.959 kbps
Audio PID Rate 2	0.000 bps
Subtitle PID Rate	0.000 bps
TTX PID Rate	0.000 bps
VPS PID Rate	0.000 bps

Video Status	
Aspect Ratio	16:9
Aspect Ratio Conversion	letterbox
Aspect Ratio Output	4:3
Video Codec	MPEG2
Video Enabled	on
Video Format In	720x576i50
Video Format Out	720x576i50
Video Mode Lock	yes
Black Picture	no
Frozen Picture	no
Video Data Errors	0
Profile and Level	MP@ML
GOP Size (M)	3
GOP Length (N)	12
Video Bitrate	3.642 Mbps

Subtitling Status	
DVB Sub Enabled	off
DVB Sub Receiving	no
DVB Sub Standard	unknown
EBU Sub Enabled	off

VBI Status	
Current AFD Value	0x000a
Current WSS Value	0x0000
Lines with Closed Caption	none
Lines with Teletext	none
Lines with Video Index	none
Lines with Test Lines	17 330 335
Lines with VPS	none
Lines with WSS	none
Incoming Closed Caption	no
Incoming EBU Subtitling	yes
Incoming Teletext	yes
Incoming VPS	no

VANC Status	
VANC Lines OP47	none
VANC Lines SMPTE 2031	8 321
SMPTE 2031 Data Id	0x0010
VANC Lines CC	none
VANC Lines Service Info	none
VANC Lines DPI	none

Sound 1 Status	
Audio Bitrate	256
Audio Sample Rate	48000
Audio Standard	mpeg1
Audio Status	ok

Sound 2 Status	
Audio Bitrate	n/a
Audio Sample Rate	n/a
Audio Standard	n/a
Audio Status	stopped

Closed Caption Status	
Closed Caption Enabled	off
Closed Caption Standard	off

Close

Demultiplexer Status

Continuity Error Count	CC Errors associated with the input stream
Packet Error Count	Number of errors for a particular channel – with a multiservice decoder, this value refers to two channels, A1 and A2.
PCR PID Rate **Video PID Rate** **Audio PID Rate** **Subtitle PID Rate** **TTX PID Rate** **VPS PID Rate**	The rate at which the PID is received, in bps.

Video Status

Aspect Ratio	Aspect ratio of the input stream
Aspect Ratio Conversion	Aspect ratio conversion method for the input
Aspect Ratio Output	Aspect ratio for the output
Video Codec	Video codec used to decode the input, typically MPEG or H.264.
Video Enabled	Indicates whether decoded video is enabled or not
Video Format In	Input format for the video, displayed in the format of: Horizontal Resolution x Vertical Resolution followed by the Frame Rate

	(interlaced or progressive)
Video Format Out	Output format for the video
Video Mode Lock	Specifies if Video mode is locked: Yes or No.
Black Picture	Specifies if picture is black: Yes or No.
Frozen Picture	Specifies if picture is Frozen: Yes or No.
Profile and Level	Specifies the Video Profile and Level.
GOP Size	Specifies the Video GOP Size.
GOP Length	Specifies the Video GOP Length.
Video Bitrate	Video Bitrate is mentioned in Mbps.

<u>**Subtitling Status**</u>

DVD Sub Enabled	Indicates whether DVB subtitles are enabled or not
DVD Sub Receiving	Indicates whether DVB subtitles are received in an incoming stream or not
DVD Sub Standard	The standard used for the incoming subtitle – either DVB or DTG
EBU Sub Enabled	Indicates whether EBU subtitling is enabled or not

<u>**VBI/VANC Status**</u>

Current AFD Value	The current AFD value is calculated based on the incoming AFD value, the aspect ratio conversion and video format conversion.
Current WSS Value	The current WSS value is calculated based on the aspect ratio conversion and video format conversion.
Lines with Closed Caption	Number of lines used for Closed Captioning
Lines with Teletext	Number of lines used for Teletext
Lines with Video Index	Number of lines used for Video Index
Lines with Test Lines	Number of lines used to embed test lines
Lines with VPS	Number of lines used for VPS
Lines with WSS	Number of lines used for WSS
Incoming Closed Caption	Indicates whether Closed Caption is available on the incoming stream or not
Incoming EBU Subtitling	Indicates whether EBU subtitling is available on the incoming stream or not

Incoming Teletext	Indicates whether Teletext is available on the incoming stream or not
Incoming VPS	Indicates whether VPS is available on the incoming stream or not
VANC Lines OP47	Indicates VANC lines OP47 if available,
VANC Lines SMPTE 2031	Indicates VANC Lines SMPTE 2031 if available.
VANC Lines CC	Indicates VANC Lines CC if available.
VANC Lines service Info	Indicates VNAC Lines Service Info if available.
VANC Lines DPI	Indicates VANC Lines DPI if available.
SMPTE 2031 Data ID	Indicates the SMPTE 2031 Data ID.

Sound Status

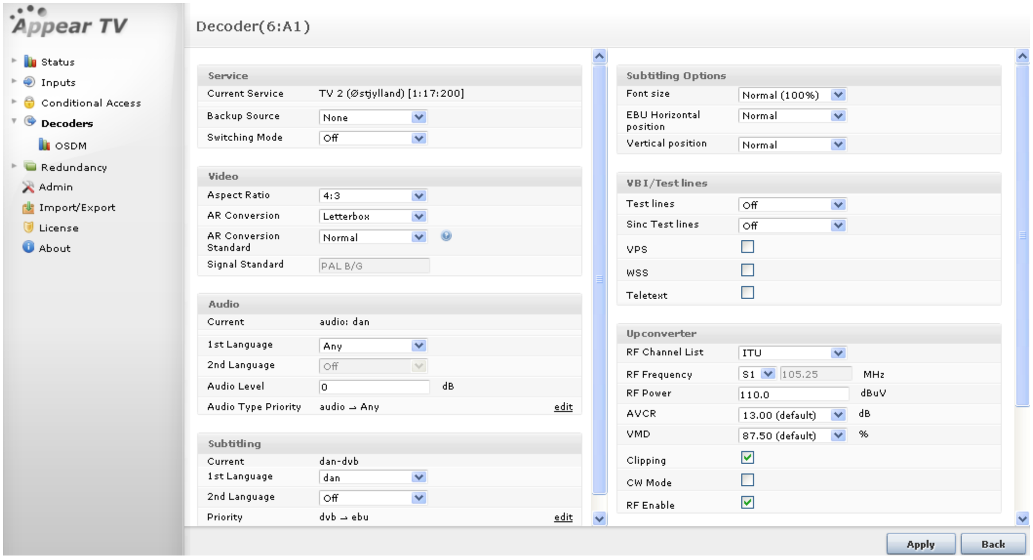
Audio Bitrate	Bit rate of the incoming audio stream
Audio Sample Rate	Sample rate of the incoming audio stream
Audio Standard	The standard in which the incoming audio stream is encoded in
Audio Status	Information relating to whether the outgoing audio stream is running or not. Possible values are *OK*, *Stopped*, or *Error*.

Closed Caption Status

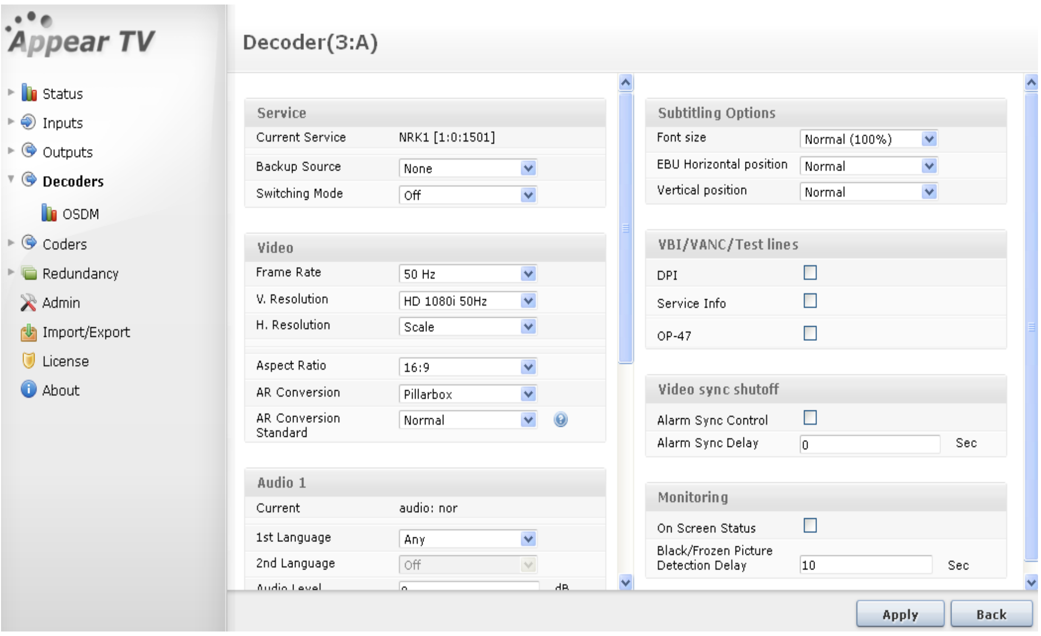
Closed Caption Enabled	Indicates if Closed Caption is enabled on the outgoing stream or not.
Closed Caption Standard	The standard used for the incoming closed caption, either one of the following: • DTVmpeg2 • STCE21 • DVS157 • UDATA130 • SCTE20 • DIVICOM21 • DTVavc • SCTE128 • ATSCa/53 • Off

7.2 Channel Configuration

Click **edit** for the decoder you want to configure and the page shown below will be displayed. The configuration parameters are organized into different sections, and decoder relevant sections are shown.



The figure above shows the configuration page for an *MPEG-2/4 SD/HD Decoder* with RF modulation and Stereo while the figure below shows the SDI version.



7.2.1 Service

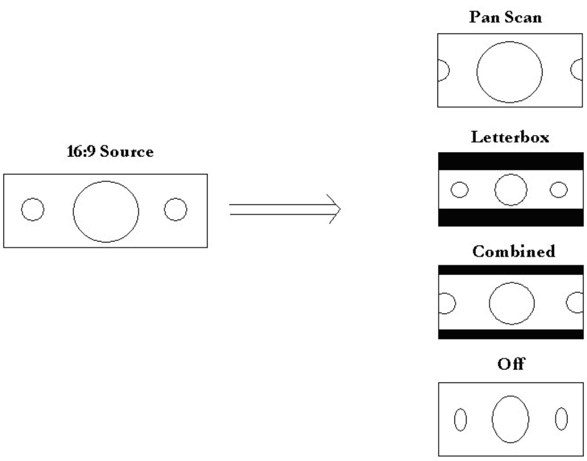
Current Service	Name of the service currently being decoded and the active source

Refer to the Input Redundancy section 12.1 for more information on the **Backup source** and **Switching mode** parameters.

7.2.2 Video

Choose a video parameter that best matches your choice of output:

Aspect Ratio	Aspect Ratio of the outgoing stream. Choose from 4:3, 16:9, or Transparent.
AR Conversion	Aspect Ratio Conversion refers to the method of converting the incoming MPEG stream to suit the video output – valid choices are Pan Scan, Letterbox (default), Combined, and Off. AR Conversion provides options regarding the video aspect ratio output of the decoder when the source is widescreen (16:9). AR Conversion will be added to the incoming picture if the input format is different from the output format. For example: o SD output – if the incoming format is 16:9, then AR Conversion is applied because the output format is 4:3. o HD output – if the incoming format is 4:3, the AR Conversion is applied because the output format is 16:9.
AR Conversion Standard	Aspect Ratio Conversion Standard refers to the method in which the decoder is being told what the incoming picture looks like – the options are Normal, DTG, and AFD Manual. The chosen standard affects the AR Conversion and WSS value.
Signal Standard	Video signal standard – this parameter is not configurable for the HP RF Decoders as it is defined by the firmware installed on the Decoder module.
Luma Filter (RF Decoder only)	This option enabled the output picture to be filtered/softened. • 0 sharp /off • 1 • 2 • 3 • 4 • 5 • 6 • 7 Very soft



AR Conversion Standard	Description
Normal	The selected AR Conversion is used. WSS value: Source is Aspect Ratio from video stream.

DTG	Digital Video Group 4.0: AR Conversion and WSS values are handled according to this specification.
AFD Manual	The selected AR conversion is used. WSS value: Source is AFD in user data sections in video stream (ETSI TS 101 154).

7.2.2.1 Signal Standard (SDI output)

The *MPEG-2/4 SD/HD Decoder* with SDI option contains these parameters for **Signal Standard**:

Frame Rate	Choose one of the following: 50Hz – mostly used in Europe 59.94/60Hz – mostly used in USA If you select 50Hz – the **VBI/V ANC/Test lines** section will be available and **V. Resolution** will display: • SD (576i 50Hz) • HD 720p 50Hz • HD 1080i 50Hz • Transparent If you select 59.94/60Hz, **V. Resolution** will display: • SD • HD 720p 59.94Hz • HD 720p 60Hz • HD 1080i 59.94Hz • HD 1080i 60Hz • Transparent *Transparent mode is where input = output*
V. Resolution	Vertical Resolution of the outgoing stream. Available for the MPEG-2/4 SD/HD SDI Decoder only.
H. Resolution	Determines the course of action in the event in the incoming video uses fewer samples than defined in the selected **V. Resolution** format. For example: if the incoming video uses 544 of the 720 samples in the SD standard, the video can either be *Centered* (with black bars on both sides to fill the rest of the samples) or *Scaled* (stretched to fill all samples with picture). Horizontal pixels are defined by the standards: • SD = 720 (720x480i and 72x576i) • 1080i = 1920 (1920x1080i) • 720p = 1280 (1280x720p) Available for the MPEG-2/4 SD/HD SDI Decoder only.

Both **Frame Rate** and **Resolution** correspond to the output format; the input format is detected automatically.

The tables below describe supported input formats and their possible output combinations, along with values for which transparent mode (Input = Output) is possible.

MPEG/H264 Input

Resolution	Frame Rate (Hz)	Horizontal	Vertical
576i	50	720/704/640/544/528/480/352	576/288
576p	25/50	720	576
480p	30/60	720	480
720p	24/25/30/50/60/59.94	1280/960/640	720
1080i	50/60/59.94	1920/1440/1280	1080
1080psf	23.97/24/25	1920/1440/1280	1080

Video Output

Frame Rate (Hz)	Resolution	Horizontal	Vertical
50	SD (576i)	720	576
	HD 720p	1280	720
	HD 1080i	1920	1080
59.94	SD (480i)	720	480
	HD 720p	1280	720
	HD 1080i	1920	1080
60	HD 720p	1280	720
	HD 1080i	1920	1080

Transparent Mode (Resolution = Transparent)

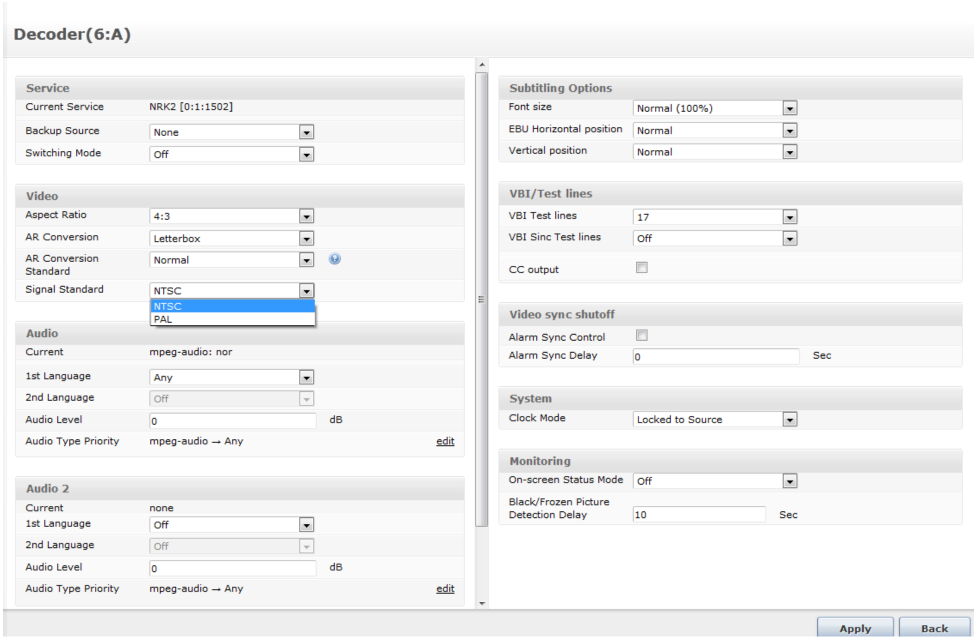
Input			Output			
Vertical	Horizontal	Frame Rate (Hz)	Resolution	Horizontal	Frame Rate (Hz)	In = Out
576i	All	50	576i	720	50	Yes
480i	All	59.94	480i	720	59.94	Yes
720p	All	50	720p50	1280	50	Yes
720p	All	60	720p60	1280	60	Yes
720p	All	59.94	720p59	1280	59.94	Yes
1080i	All	50	1080i50	1920	50	Yes
1080i	All	60	1080i60	1920	60	Yes
1080i	All	59.94	1080i59	1920	59.94	Yes
576p	All	25	576i	720	50	No
576p	All	50	576i	720	50	No
480p	All	60	480i	720	59.94	No
480p	All	30	480i	720	59.94	No
720p	All	24	720p60	1280	60	No
720p	All	25	720p50	1280	50	No
720p	All	30	720p60	1280	60	No
1080pfs	All	23.97	1080i59	1920	59.94	No
1080pfs	All	24	1080i60	1920	60	No

Transparent Mode (Resolution = Transparent)

Input			Output			
Vertical	Horizontal	Frame Rate (Hz)	Resolution	Horizontal	Frame Rate (Hz)	In = Out
1080pfs	All	25	1080i50	1920	50	No

7.2.2.2 Signal Standard (Composite output)

The ADM supports both PAL and NTSC output. Setting this to the NTSC mode will make several NTSC related features available in GUI as shown below.



7.2.3 Audio

The various audio languages available for a selected service are located in the respective drop down list. All available audio languages will be displayed, either as separate stereo streams or as dual mono streams. In dual mono streams, the L and R channels carry different languages. The user interface will notify if the selected service carries dual mono audio; the selected language will be output on both the L and R audio channels.

The *MPEG-2/4 SD/HD SDI Decoder* supports decoding of two stereo audio tracks labeled **Audio1** and **Audio 2**. Both audio tracks can be embedded into the SDI stream.

Current	Active audio language and type
1st Language	1st preferred audio language – chosen whenever available
2nd Language	2nd preferred audio language – chosen if available and the 1st Language is not available.
Audio Level	Value entered has to be between -10 and +6dB; default value is 0.
Audio Type Priority	Audio type priority order – all audio PIDs have a stream type format. Valid entries are the supported stream type formats as well as "any" or "off". Click on the **edit**

	link to modify the priority order. For decoders without the Dolby® Digital Plus option, if AC-3 is selected, the audio will not be decoded but only passed through to the SDI output.
SDI Output Channels	Configuration for output channels in the embedded SDI signal

If none of the selected priority audio languages are available from the incoming service, the **1st Language** listed in the service will be chosen.

i	Only languages currently available in the video service can be selected from the drop down list. Additional languages can be selected after they are added under the **Admin** view.

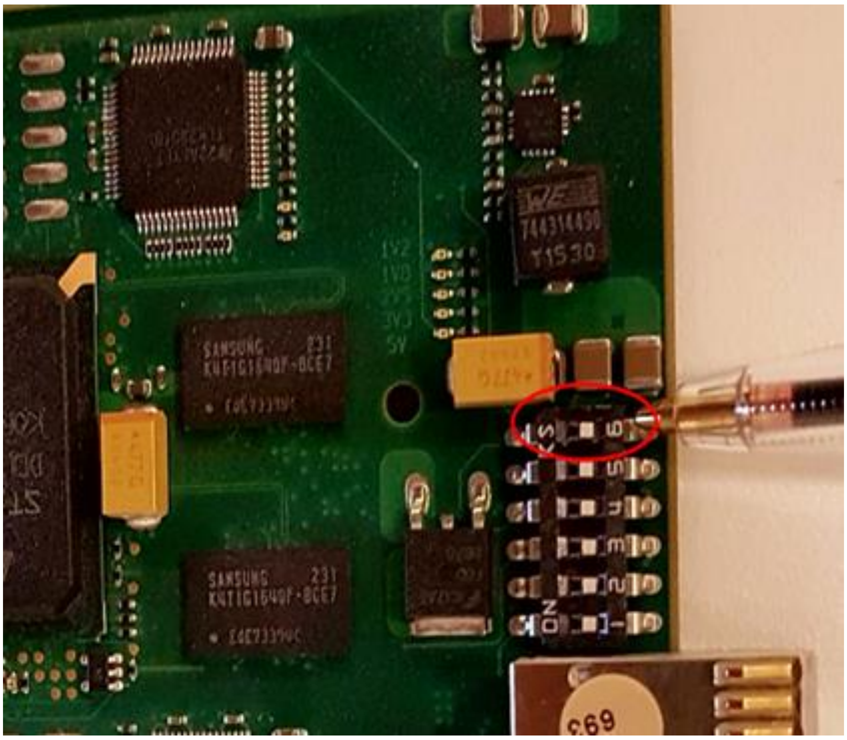
7.2.3.1 Audio selection for SDI Decoder.

On the SDI Decoder module, it is possible to configure, per audio output, which embedded output this will be available on. The options in this dialog are:

- 1 & 2
- 3 & 4
- 5 & 6
- 7 & 8

7.2.3.2 SDI Decoder 4 channel Audio Mode

It is possible to configure an SDI Decoder in 4 channel audio mode. This will allow the module to decode 4 audio languages (maximum 2 Dolby) and output this on Port A output. To enable this mode, DIP switch #6 on SDI decoder should be set to ON.



To configure 4 audio channel output, the audio outputs will be shared between the two decoder channels. Both port A and B will need to be configured with the same service, and then the audio output channels set accordingly.

Decoder

Slot	Channel	Input Source	Enable	Output	Status	Edit
11	A	Cartoon Network [1:8:7006]	✓	SDI	view	edit
11	B	Cartoon Network [1:8:7006]	✓	SDI	view	edit

7.2.3.3 Dual Audio/Mono Configuration for MPEG-2/4 SD/HD Quad RF Decoder

It is possible to configure the Quad RF Decoder module to create an output Dual Audio/Mono carrier from 2 stereo input sources. In this mode, the density of the module is reduced in half. In order to configure this, you will need to access the module **Setup** features from the Maintenance Center and convert the module to 'Dual'. This is seen in the screenshot below:

Maintenance Center

Click on a card to setup or several cards to reboot or upgrade

Slot	Type	SW Ver	Boot Ver	Serial	SW Package
0	ipswitch (MMI)	3.14.335	2012.10-18259	120800931	mmi
1	adm	3.14.2705	1.0.2455	102100005	adm
2	tvmod	3.14.3	3.14.3	105000083	tvmod
3	adm	3.14.2705	1.0.2455	102100009	adm
4	adm	3.14.2705	1.0.2455	112600041	adm
5	tvmod	3.14.3	3.14.3	122301945	tvmod
6	adm	3.14.2705	1.0.2455	121201127	adm
7	adm	3.14.2705	1.0.2455	122301371	adm
8	tvmod	3.14.3	3.14.3	104100002	tvmod
9	adm	3.14.2705	1.0.2455	122301453	adm
10	adm	3.14.2705	1.0.2455	122301449	adm
11	tvmod	3.14.3	3.14.3	122301911	tvmod
12	adm	3.14.2705	1.0.2455	104300260	adm
13	adm	3.14.2705	1.0.2455	112600015	adm
14	tvmod	3.14.3	3.14.3	104100001	tvmod
15	adm	3.14.2705	1.0.2455	103400131	adm

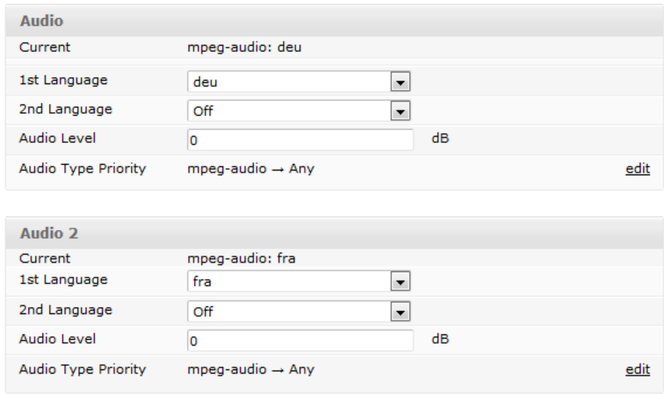
Convert Card

Audio decoder: Dual (Single / Dual)

Apply | Cancel

Once converted, the new modules will be available in the Decoders view in the Navigation Pane.

13	A	Viasat History [0:36:6050]	✓	RF	2 (NTSC M)	55.2500	view	edit
13	B	Service 2 [0:41:2]	✓	RF	3 (NTSC M)	61.2500	view	edit
15	C	arte HD [0:38:10302]	✓	RF	4 (NTSC M)	67.2500	view	edit
15	D	Das Erste HD [0:38:10301]	✓	RF	5 (NTSC M)	77.2500	view	edit

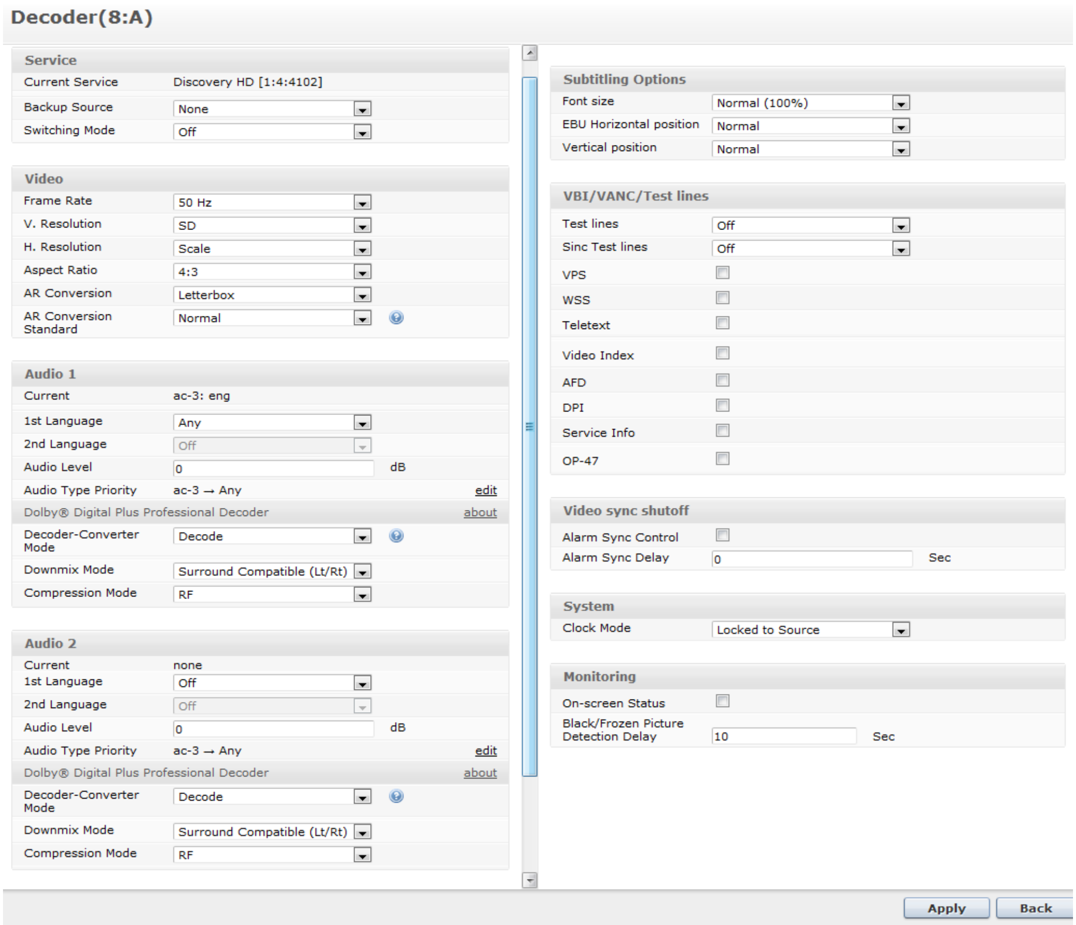


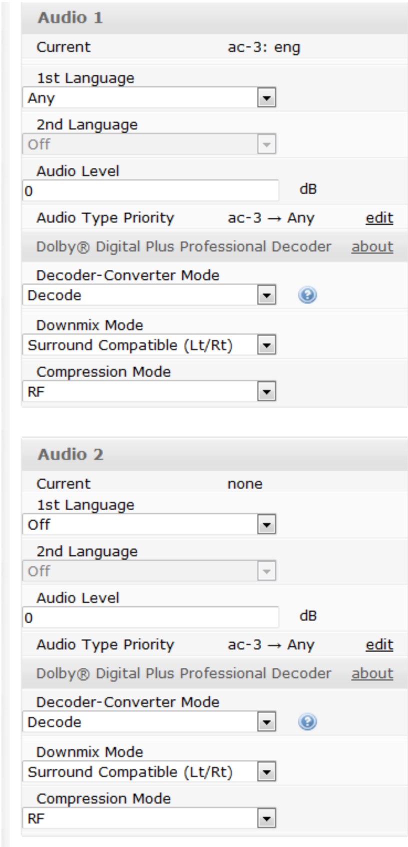
Once **Dual Mono** is selected for the **Stereo Mode**, both Audio 1 and Audio 2 will be available for configuration. Each can then be configured for the required audio languages that will be output as Dual Audio/Mono.

7.2.3.4 Dolby® Digital Plus Professional Decoder

For decoders with the Dolby® Digital Plus option a "Dolby® Digital Plus Professional Decoder" section is available with Dolby® specific configuration parameters. These do only take effect if the input is of type AC-3 or E-AC-3.

Additional parameters in Audio section for decoders with Dolby® Digital Plus option in **edit** option:





Decoder-Converter Mode	Specify any of the options from the below list • Decode • Convert to AC-3
Decode	AC-3 and E-AC-3 are decoded to PCM
Convert to AC-3	AC-3 is passed through as is. E-AC-3 is converted to AC-3 with a fixed bitrate of 640 kbps, according to Dolby® specifications.

If "Decode" is selected, two decoding related settings are unhidden: Downmix Mode and Compression Mode.

Downmix Mode	Specify any of the options from the below list • Stereo (Lo/Ro) • Surround Compatible (Lt/Rt)

The audio output of the decoder always consists of 2 channels. If the content to be decoded consist off more than 2 channels, downmixing has to be performed. The "Surround Compatible (Lt/Rt)" option performs a downmix of 5.1 channels to a 2 channel output that can be decoded by Dolby® Surround and Dolby® Surround Pro Logic® decoders; 2 channel content will not be downmixed.

Compression Mode	Specify any of the options from the below list • None

- Line
- RF

The available options represent standard operational modes automatically configuring the decoder to implement dialogue normalization and dynamic range control.

On clicking on about, we get below trademark notice and copyright notice.

Dolby® Digital Plus Professional Decoder.

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7.2.4 Subtitling

The subtitling drop down list provides available languages for both DVB Subtitling and EBU Teletext subtitling.

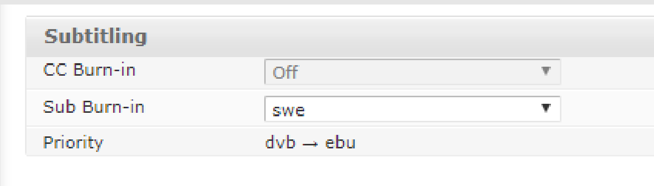
Current	Active subtitling language
1st Language	1st preferred subtitling language
2nd Language	2nd preferred subtitling language
Priority	Subtitling priority order – valid entries are DVB, EBU, DVB HH (hearing impaired) and EBU HH (hearing impaired). Click on the **edit** link to modify the priority order.

The subtitling prioritizing search will start using the 1st Priority Language and try to match the entries in the priority order list. If no match is found the same search is done with the 2nd Priority Language; subtitling will be disabled if there is no match. If the value of **Frame Rate** is set to **59.94/60Hz**, the above parameters: **Current**, **1st Language**, **2nd Language**, and **Priority** will be replaced with **CC Burn-in**.

	Only languages currently available in the service can be selected from the drop down list. Additional languages can be selected after they are added under the **Admin** view.

If the output frame rate is 59.94 or 60 Hz, then the subtitle options will be replaced by the Closed Caption options displayed below.

CC Burn-in	Select one of the five options (CC1, CC2, CC3, CC4, Off) given in the drop down box shown below.



	DVB subtitle burn-in is supported in NTSC mode

7.2.5 Subtitling Options

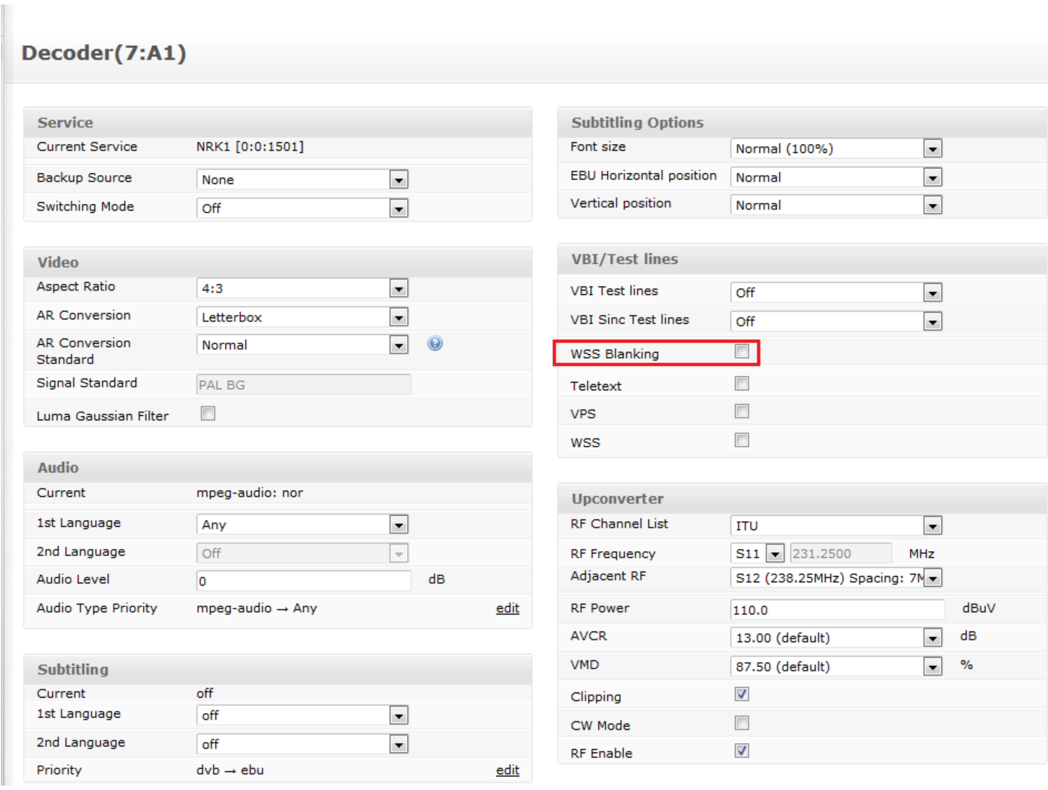
The Subtitling options can be used to adjust the display properties of the decoded subtitles. The options available are:

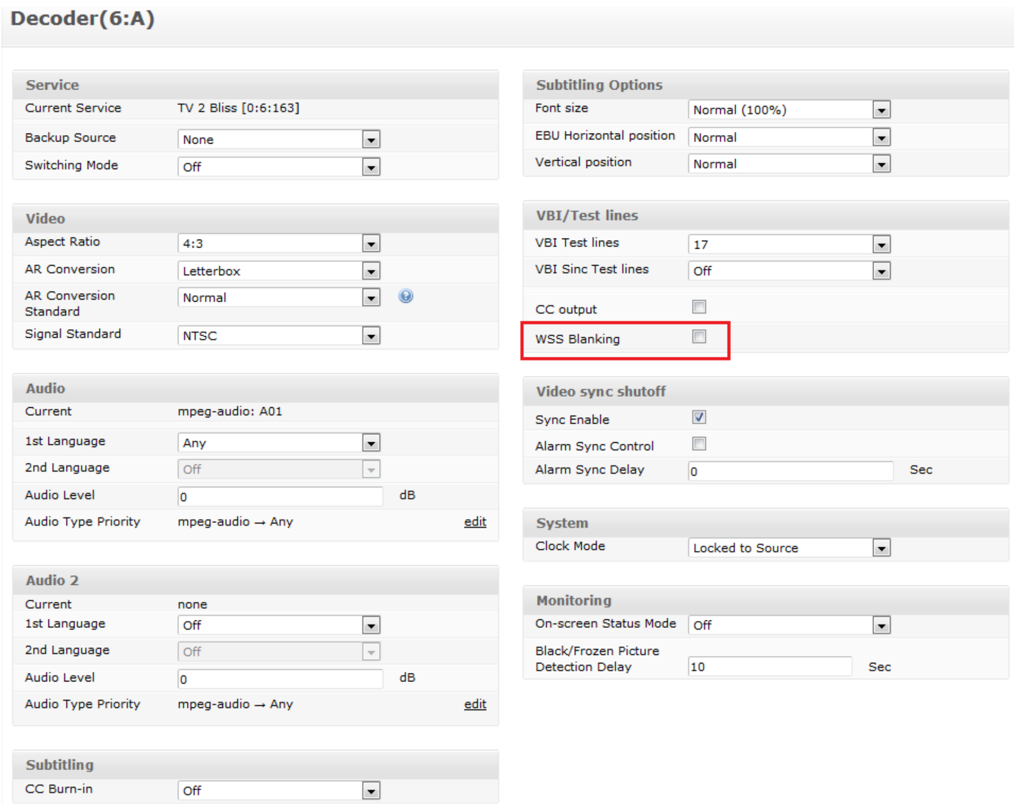
Font size	Font size of the subtitles displayed. Represented by a percentage.
EBU Horizontal position	Horizontal position of the subtitles displayed (according to the EBU standard)
Vertical Position	Vertical position of the subtitles displayed

7.2.6 VBI/Test lines (or VBI/VANC/Test lines)

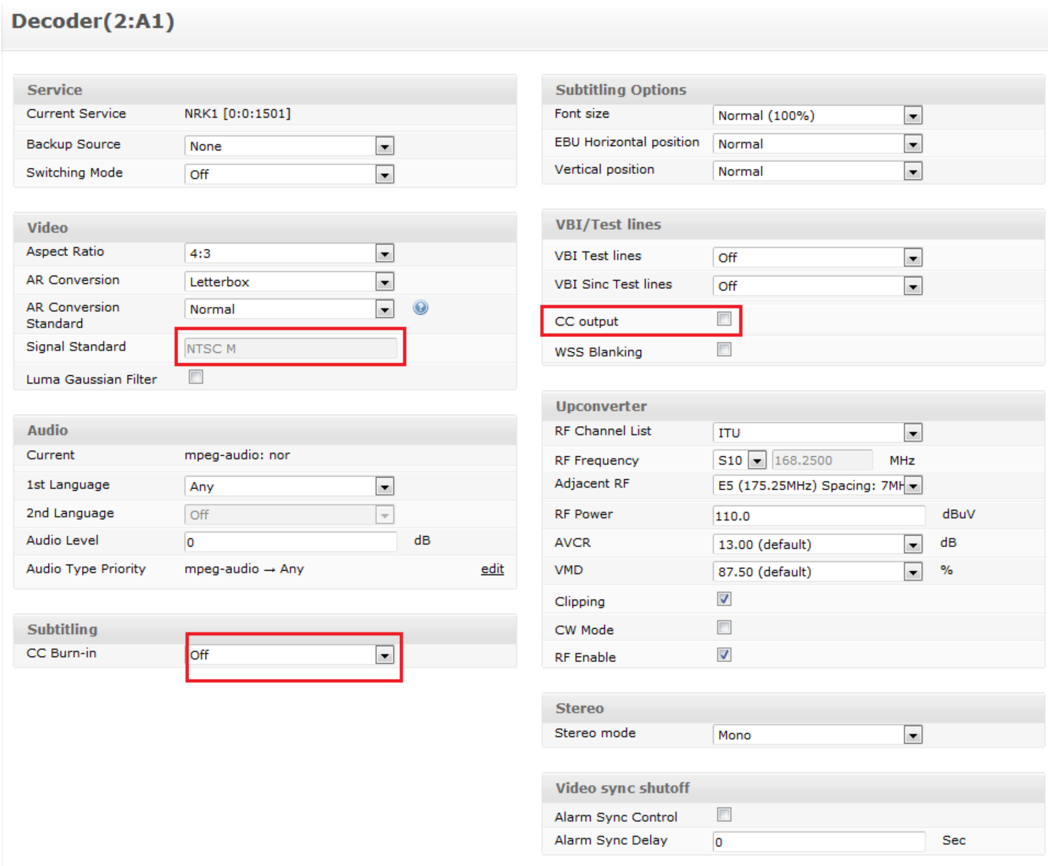
The following table describes the options for the VBI, Testlines and VANC options.

Test lines	Number of Vertical Blanking Interval (VBI) test lines – valid entries are Off(default), 17 or 17 and 18 as defined by ITU T J.63 (625 Line System). If line 17 is selected, test lines are inserted in both lines 17 and 330 (330 is line 17 in field 2) For 17 and 18, test lines are added to 17, 300, 18, and 331 (331 is line 18 in field 2) Interlaced video consists of two fields that make one picture – field 1 and 2 are interlaced to create a 576 line frame.
Sinc Test lines	The line number in VBI to insert the Sinc test signal – valid entries are Off (default), 319 or 335 *[Off or 335 for the MPEG-2/4 SD/HD Decoder]*. The Sinc or (Sin(x)/x) test signal is used to measure the group delay and amplitude response versus frequency. Using Off will disable the Sinc Test lines function.
VPS	Video Program System (VPS) is enabled by checking the indicated checkbox. VPS data (if there is any) is then inserted into the VBI data field; default value is Off. VPS follows the ETSI TS 101 231 standard.
WSS Blanking	Blank the WSS line 23 when it has been encoded into active/visible video.
WSS	Wide Screen Signaling (WSS) is enabled by checking the indicated check box. The AR Conversion parameter is then inserted into the VBI data field in order to allow WSS enabled widescreen TVs to display the aspect ratio as intended. WSS follows the ETSI EN 300 294 standard.
Teletext	Teletext is inserted into the VBI field of the output video signal – enable it by checking the indicated checkbox.





The *MPEG-2/4 SD/HD Decoder* with <u>SDI and RF with NTSC signal</u> option contains these additional parameters:



CC output

Add Closed Captioning output

- VBI 21 – Output CC on VBI line 21
- Off – turn off CC

The MPEG-2/4 SD/HD decoder currently supports CEA-608 encoded closed caption. The decoder automatically extracts closed captions from DIVICOM, SCTE-20, and SCTE-21.

Video Index

Enabled by checking the indicated checkbox – Video Index data is then inserted into the VBI data field if there is any. The default value is Off.

Video Index follows the SMPTE RP186 standard.

AFD

Active Format Description can be received from the MPEG stream and output in the SDI signal. If enabled, AFD is output in the SDI signal. If the incoming signal does not contain AFD, the decoder will create an AFD value. If the decoder applies any Aspect Ratio conversion or up/downscaling of the video format, the decoder will modify the AFD value from the MPEG stream to reflect these changes.

If the **AR Conversion Standard** is set to AFD Manual or DTG, the AFD value from the MPEG stream will be used.

OP-47

Support for the Australian Standard for subtitles, OP-47.

DPI

Digital Program Insertion – enables translation of incoming SCT35 packets into SCT104.

Service Info	Description of the service

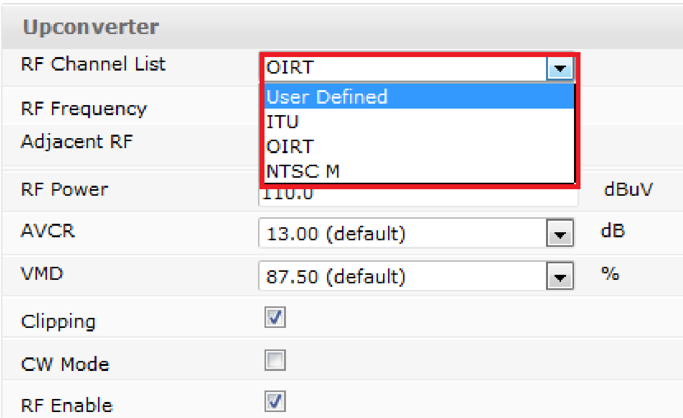
7.2.7 Descrambling for the Decoder Module

Depending on the module in use, a service may be descrambled on the decoder itself, or alternatively with a separate descrambler module. There are several reasons why it is desirable to install a separate descrambler module, for maximizing the number of services to be descrambled.

Descrambler	**Internal** – use the CAM on the module itself. If a CAM is installed the stream will be piped via the CAM regardless of the GUI settings; this is controlled by the HW. **CAM module** – if the unit contains descramblers they will be listed as optional descrambler modules that can be selected to perform descrambling.

7.2.8 Upconverter (RF Parameter Configuration)

For Decoder modules with up-converter the configuration page will display an **Up-converter** section.



The following up-converter parameters are available for configuration:

RF Channel list	Select which channel plan to use. The available options are ITU (C.C.I.R), OIRT, NTSC Mand User defined.
RF Frequency	Sets the carrier frequency of the output. Choose from a set of predefined frequencies (according to the selected RF Channel list), or alternatively enter a specific frequency in the text box.
RF Power Level	Determines the power of the output signal. Power level boundary values will depend on the Decoder module and will be displayed when the mouse cursor hovers over the text box.
AVCR	This parameter adjusts the Audio carrier output level compared to the video carrier output level. The resulting output level will be the selected value down from the video carrier. Please note that this is power and not amplitude. Nominal value and range will depend on the Decoder module being configured.
VMD	Video Modulation depth. This level can be adjusted from 80 to 90%. This parameter is

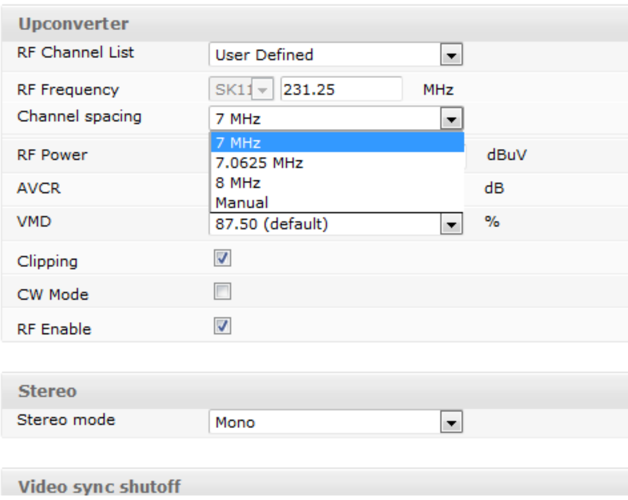
	only available for the **HP RF Decoders**.
Clipping	Determines how video is clipped before modulation. Enabling clipping result in video being clipped 5% above configured modulation depth. Off means video is not clipped. This parameter is only available for the **HP RF Decoders**.
CW mode	Continuous Wave Mode. The output will be an un-modulated video carrier with no audio carriers present.
RF Enable	Enables the RF signal on the output. The RF output signal will be turned off when this is not enabled.

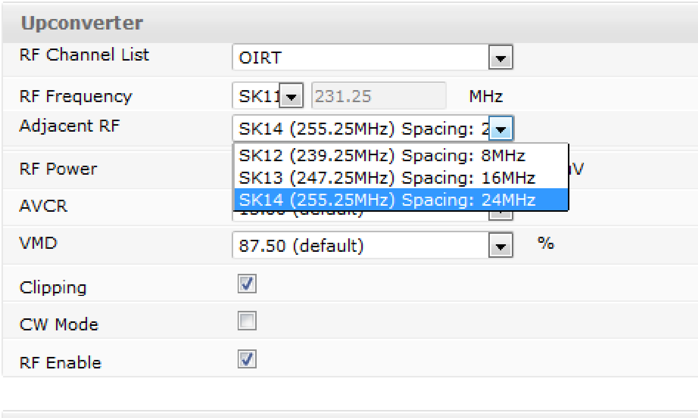
Every time the system boots or a change has been applied to the **RF Frequency**, **RF Power Level**, or **RF Enable**, the decoder will automatically calibrate the power level to match the selected power output level.

7.2.8.1 Semi-agile frequency setting

When configuring the Quad Decoder module with 8 output channels, it is possible to configure the channel spacing for the x2 output frequencies. This allows the operator to have no, one or two channel spacing between the output carriers, depending on the channel width.

Channel Spacing	The available options are under User defined RF channel list are; ITU (Low Band) • 7 MHz • 14 MHz • 21 MHz ITU (High band) and OIRT • 8 MHz • 16 MHz • 24 MHz Manual • 7 MHz • 7.0625 MHz • 8 MHz • Manual
Manual	Manually enter the channel spacing in the text box.





7.2.9 Stereo (RF Parameter Configuration)

For Decoder modules which support NICAM or A2, and where the stereo license is installed, the NICAM or A2 configuration page will display a **Stereo** section where it is possible to choose the option **NICAM** or **A2** for **Stereo Mode**, as shown in

When NICAM is selected, the NICAM carrier gets enabled on the RF output and the following configuration parameters are available. Refer to ETSI standard EN300163 v.1.2.1 before changing the default configuration for NICAM:

Nicam/Video Carrier Ratio	The nominal output level for the NICAM carrier is 20dB down from the video carrier. This value refers to power and not amplitude. The level can be adjusted from 3dB to +7dB.
Nicam Mode	Choose between Stereo, Single Mono, or Dual Mono
Nicam Reserved	Turn the reserved flag On or Off. Default value is On (available on carrier). Some TVs require the reserved flag to be turned On to enable NICAM.

When A2 is selected, the A2 carrier is enabled on the RF output as well as the following configuration parameters are available:

A2 Mode	Select the appropriate A2 Mode: • **Mono** – Mono audio • **Stereo** – Stereo audio • **Dual Mono** – Static dual mono • **Controlled by VPS** – Audio is dynamically set according to information retrieved from the VPS • **Controlled by SI** – Audio is dynamically set according to information retrieved from the SI
A2/Video CR	**A2/Video Carrier Ratio.** The nominal output level for the A2 carrier is **20 dB** down from the video carrier. This value refers to power and not amplitude. The level can be adjusted from **-3dB to +7dB.** This parameter is only available for the **HP RF Decoders**.

To create a dual mono output with two different PIDs:

- Choose Dual Mono under NICAM Mode

- Select one language on Audio
- Select another language on Audio 2

This will create a dual mono output with Audio language on the left channel and Audio 2 language on the right channel.

i	The functionality to create a dual mono output service from two stereo audio PIDs is only available on the ADM HR RF output module

7.2.10 Video Sync Shutoff

When a critical video alarm is turned on, the video sync is turned off. A user defined delay specifies the time between the alarm going off and video sync being switched back on.

The **Video sync shutoff** section holds these configuration parameters:

Alarm Sync Ctrl	Alarm Synch Control can be switched on/off
Alarm Sync Delay	Alarm Sync Delay can be adjusted from 0 to 99 seconds.

When sync control is on, the following alarms will turn off the video sync:

- Transport Stream Missing
- Video PID Missing
- Video PID Scrambled
- Video Missing
- Video Data Error

7.2.11 System

This option allows you to control the reference clock signal that is used in decoding the output service. The options available are:

Local	The internal system clock will be used as a reference
Locket to source	The clock reference from the incoming stream will be used
Genlock	If the Genlock option is available, this option will be displayed. Please see section 7.3 for more information.

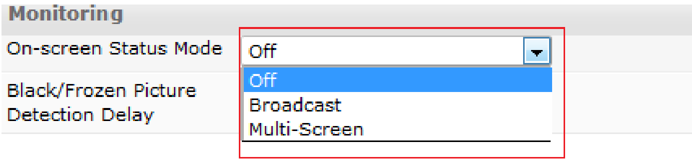
7.2.12 Monitoring

In the monitoring section is possible to configure various monitoring options on the output service.

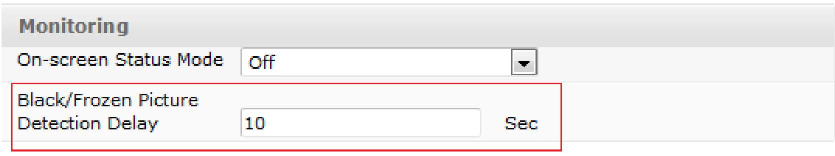
The On-screen Status Mode allows the user to enable an overlay on the output picture which contains various status parameters. This has the following options:

Off	Disable the On screen monitoring
Broadcast	In Broadcast, we display the following parameters on screen:

	• Video Input AR, codec, format • Video output AR, format, AR conversion • Audio: standard, language • DVB subtitling: incoming , standard • EBU subtitling: incoming , language • VBI: EBU, TTX, VPS, AFD in/out, WSS
Multi-Screen	In Multiscreen, we display the following: • Video In: Resolution, Aspect Ratio, Codec, Bit Rate, Profile/Level, GOP Size, GOP Length. • Video Out: Resolution, Aspect Ratio, AR Conversion.

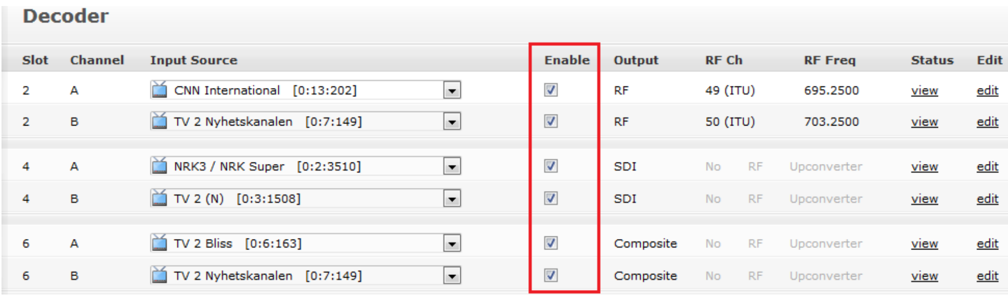


The Black/Frozen Picture Detection Delay allows the user to customise the delay before these alarms are raised for the specific output service.



7.2.13 Sync/Output Control

From the **Decoder** overview page, it is possible to enable/disable the output of all the decoders. On SDI/Composite output modules, this will disable the Sync while on RF output modules, this will disable the output RF carrier.



Decoder

Slot	Channel	Input Source	Enable	Output	RF Ch	RF Freq	Status	Edit
2	A	CNN International [0:13:202]	☑	RF	49 (ITU)	695.2500	view	edit
2	B	TV 2 Nyhetskanalen [0:7:149]	☑	RF	50 (ITU)	703.2500	view	edit
4	A	NRK3 / NRK Super [0:2:3510]	☑	SDI	No RF	Upconverter	view	edit
4	B	TV 2 (N) [0:3:1508]	☑	SDI	No RF	Upconverter	view	edit
6	A	TV 2 Bliss [0:6:163]	☑	Composite	No RF	Upconverter	view	edit
6	B	TV 2 Nyhetskanalen [0:7:149]	☑	Composite	No RF	Upconverter	view	edit

7.3 Genlock configuration

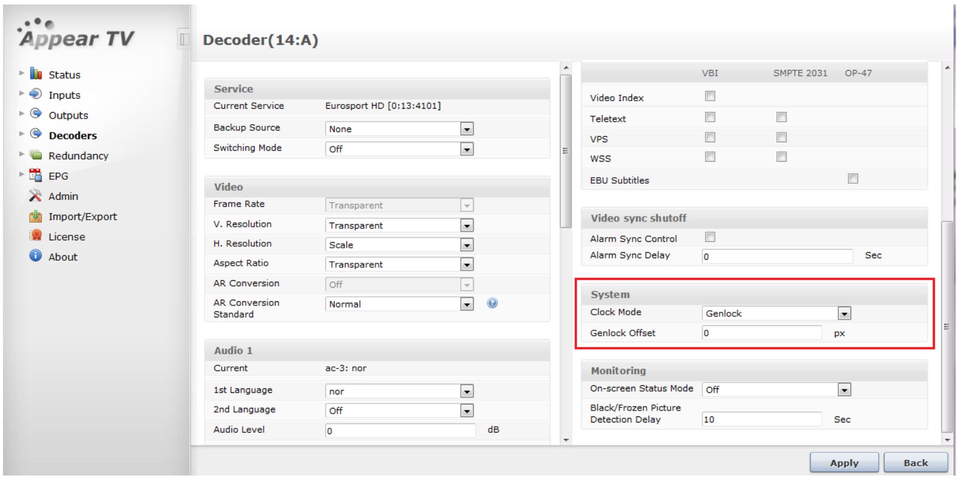
Genlock functionality is enabled in GUI through the "Clock Mode" setting. If the MPEG-2/4 Decoder is Genlock capable, the drop down menu will include the "Genlock" option.

A PAL black burst reference signal connected to the "Sync In" port of the Switch module.

Genlock is currently supported in the three output resolutions 576i, 720p50 and 1080i50.

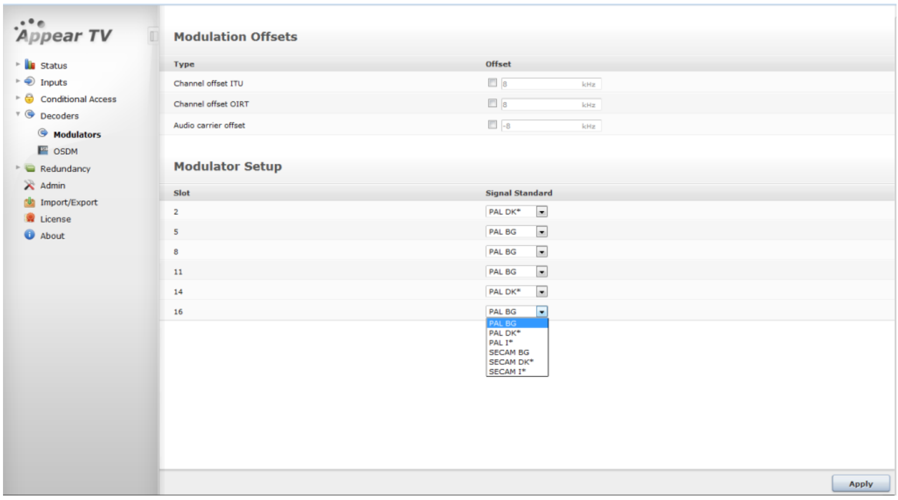
In order to enable the Genlock functionality it requires that you have the following:

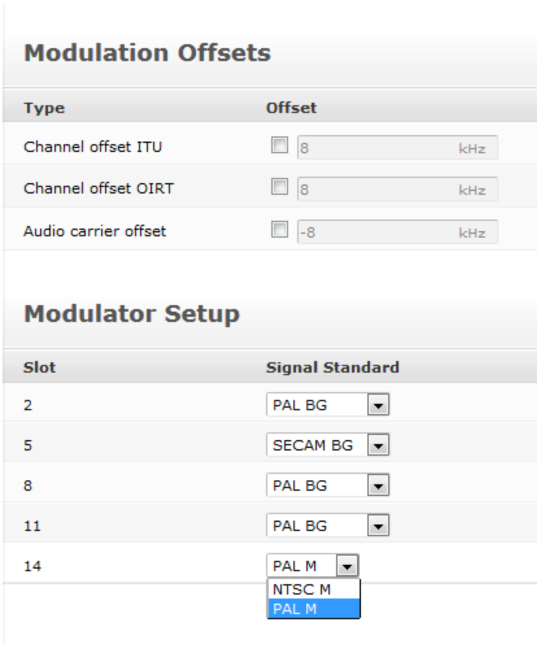
- Switch Module with Frame Synchronization Input (BNC port)
- Chassis with Genlock support (DC1001, SC2001, MC3001, XC5000)
- MPEG-2/4 Decoder with the Genlock hardware option.
- Valid range values for Genlock offset delay must be from -10000 to 10000.



7.4 Modulator Configuration

The Quad Decoders 'tvmod' card supports various PAL, NTSC and SECAM modulation standards. It is possible to select the modulation mode via **Decoders →>Modulators-> Modulators Setup** in the GUI.





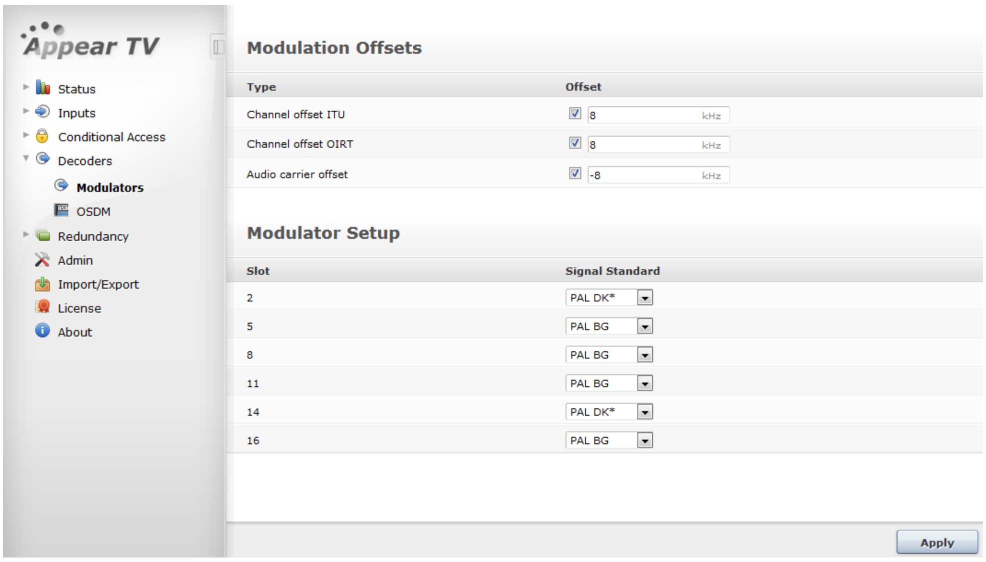
7.4.1 Carrier offset in TVMOD

For a number of TV sets, their demodulators may introduce noise in the picture due to inter-modulation between signal components. A solution to this is to offset the channel frequency and/or the audio carrier frequency.

This can be enabled and adjusted on the **Decoder-> Modulator->Modulation offsets section**. All defaults are off.

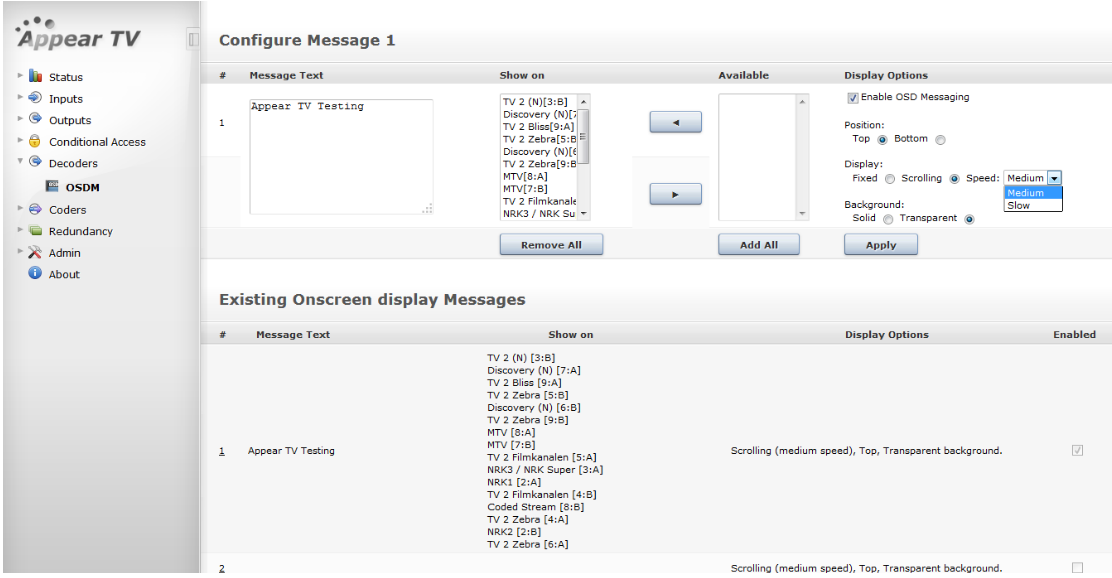
OIRT: Channel offset	Enable checkbox, Frequency (-16->16 KHz) : Default OFF, 8Khz
ITU: Channel offset	Enable checkbox, Frequency (-16->16 KHz) : Default OFF, 8Khz
Audio carrier offset	Enable, Frequency(-8, +8) Default: OFF, -8

Audio carrier offset, when enabled, applies to all channels (irrespective of OIRT/ITU/User Defined configuration)



7.5 On Screen Display Messaging (OSDM)

The unit supports On Screen Display Messaging (**OSDM**), enabling service providers to display up to 48 unique short information messages on a given channel. This function is optional and requires a license.



7.5.1 Enabling OSD Messaging

In order to add OSD messages to an input stream the following procedure should be used:

1. Click on the **ODSM** tab in the **Navigation Pane** to display the On Screen Display (OSD) Messaging window
2. Choose which message number to enable (#1-48) by clicking on the appropriate message number. The message numbers are listed in red on the left.
3. Add/Remove the channels on which you want the message to appear, using the arrow buttons between the **Available** and the **Show on** fields. The channels will then be listed in the **Show on** textbox. Only one Message Text can be displayed at a given channel at a time. Selected channels will be removed from the **Available** textbox.
4. Write the message to be displayed in the Message Text box. This message can contain up to 255 ASCII characters.
5. Select the vertical position by choosing Top or Bottom.
6. Select the message appearance – either Scrolling or Fixed.
7. Speed can be either **Medium** or **Slow**.
8. Background can be **solid** or **transparent**.
9. Check Enable OSD Messaging to activate the message. Otherwise, the message will be disabled until you enable it.
10. Click Submit to register the message.

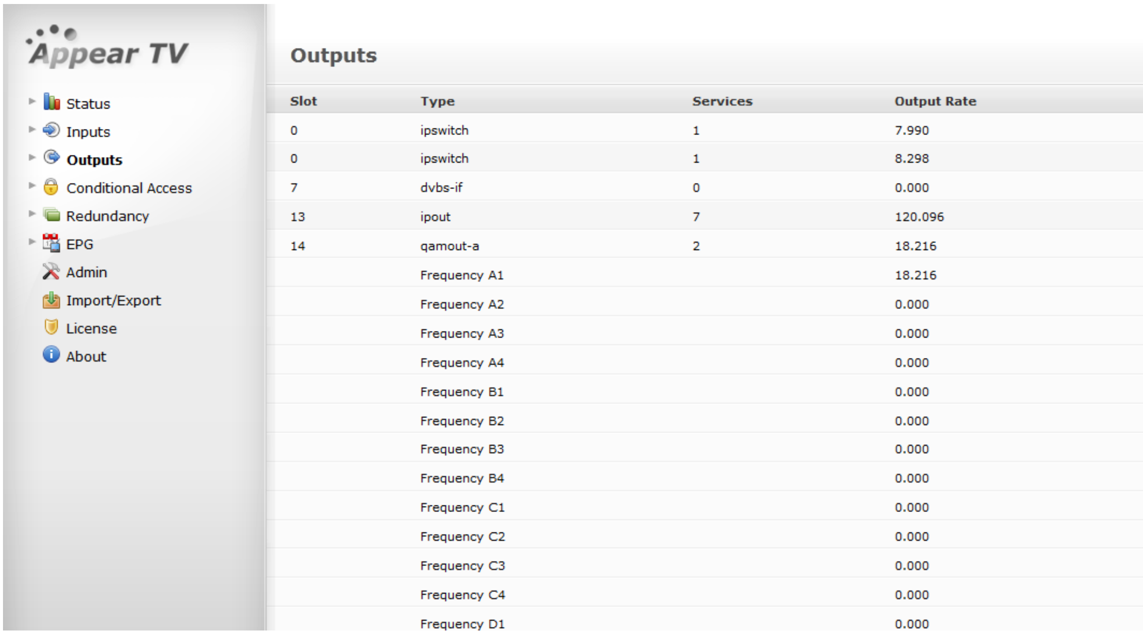
7.5.2 Disabling OSDM

Follow the procedure below to disable OSDM

1. Open the **On Screen Display Messaging (OSDM)** window by clicking on the OSDM tab.
2. Choose which message number to disable (#0-4) by clicking on the appropriate message number. The message numbers are listed in red.
3. Deselect Enable OSD Messaging to disable the message. Note that the message will still be available and can be enabled again later.
4. Click Submit to register the message.

8 Digital Output Configuration

The Appear TV platform can be used to host a number of different output modules. Select **Outputs** from the Navigation Pane to view all available output modules along with key information on the current configuration for each output module. When expanded, this menu also provides a list of the output cards, including type and installed slot.



The following information is available from the Outputs view:

Slot	Slot position in the chassis
Type	Type of output module / output port
Services	Number of services assigned to the output module
Output Rate [Mbps]	Total data rate of all configured services - the rate shown includes all overhead data such as IP headers.

Creating an output transport stream is done via the **Outputs** view present for each output module. Before an output can be created, the input module(s) must be configured correctly such that the list of input services is present.

The unit supports two types of output streams: Multiple Program Transport Stream (MPTS) and Single Program Transport Stream (SPTS). MPTS is available for all MPEG output modules while SPTS is only available for IP output modules in addition to MPTS.

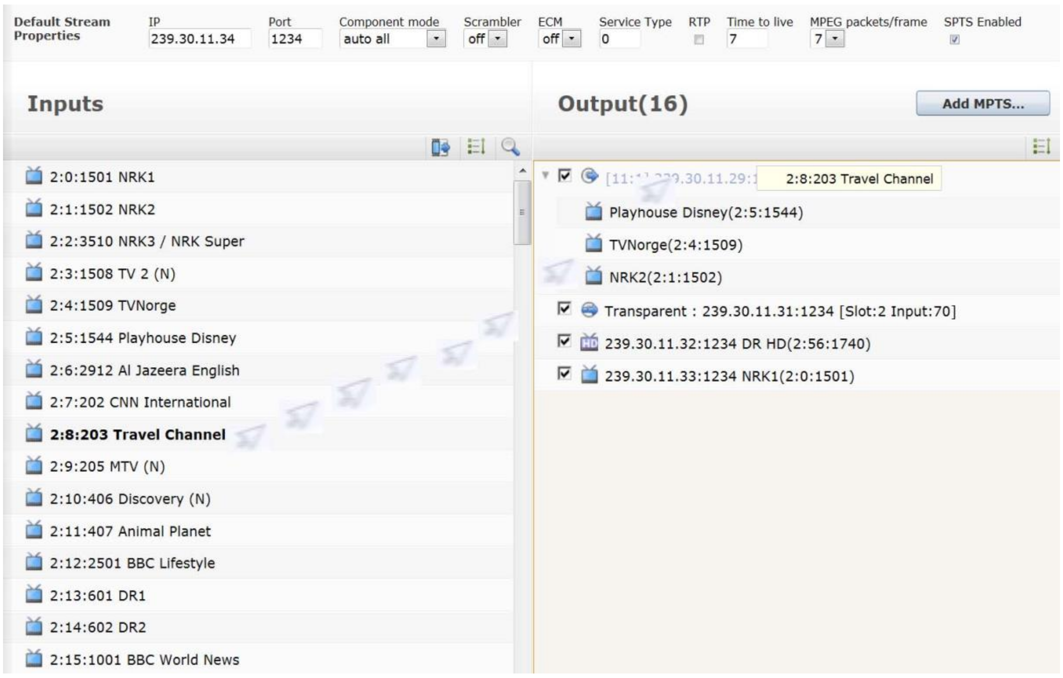
MPTSs are always Constant Bit Rate (CBR) streams. By default SPTSs are Variable Bit Rate (VBR), i.e. the same as the input source, but can be configured to be CBR.

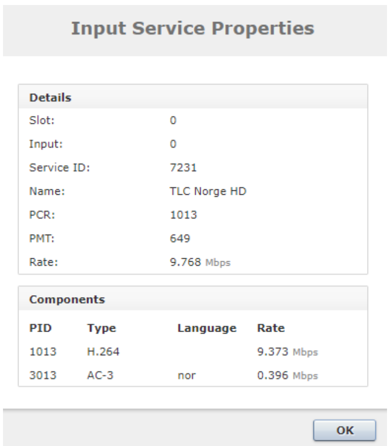
8.1 Input Stream Selection

When you select an output module, you will be presented with a list of Inputs. This will consist of ports (for MPTS inputs) or services (IP SPTS inputs). In order to expand the services in an MPTS input, you can click the symbol. In order to output a service from the available input services, you only need to drag a service from the **Inputs** panel and drop it on the **Output** panel.

- To add a service to an MPTS, drop it on the MPTS symbol . This applies to IP MPTS outputs as well as QAM/COFDM/ASI/etc outputs.
- To add an IP SPTS to an IP output module, drop the service anywhere in the empty space on the Output panel.
- To add a Transparent output drag and drop the input port to an empty space on the Output panel (IP output) or the output MPTS (other modules).

To toggle transmission of an output stream on or off, use the checkboxes on the left of that particular stream to enable or disable it.





When double clicking on a input service, you will see a dialog box with information about the input service. This will show:

- Service bitrate
- List the components (show PID,type, language), and show the component rate

Once the output is configured, the system will automatically generate PSI/SI as well as add the service related PIDs to the output (as configured in **Outputs → PSI**). For more information on PSI/SI configuration, refer to Sections 8.3.4.

If you are unable to drag and drop an input service to an output, there could be a conflict in your output setup, most likely due to a duplicate ServiceID/Program Number.

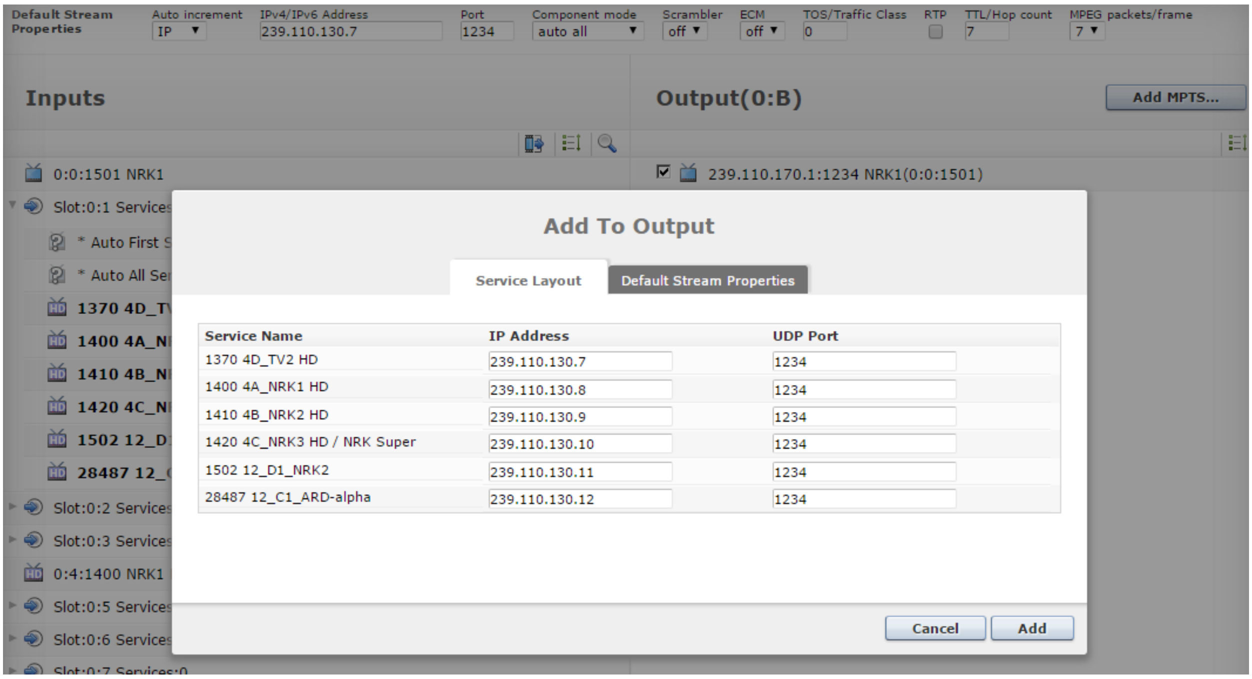
For example, if you already have an output service with ServiceID 100, and you attempt to drag and drop an input service, with ServiceID 100 – the system will assume that you are trying to create two output services with the same ID. To get around this, first remap the output service ID for the existing one. Then, add the new service.

This is only relevant when adding the same ServiceID to an MPTS.

8.1.1 Bulk Selection on output view

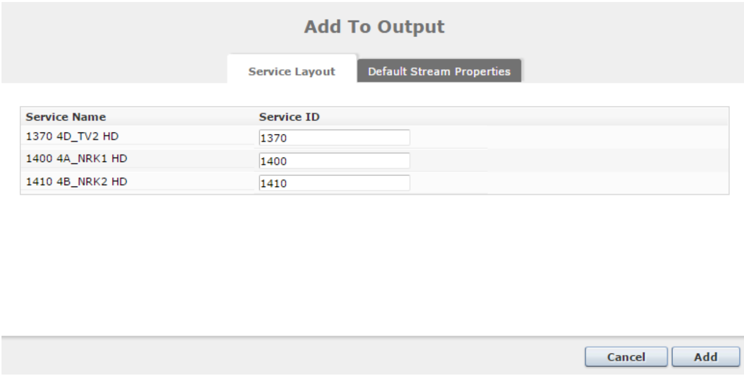
8.1.1.1 Configuring SPTS using bulk selection

You can drag a multiple service from the Inputs panel by selecting these using either standard shift key or control key and drop these on the Output panel as SPTSs. When doing this, you will be presented with the following dialog box in which you can configure each stream.



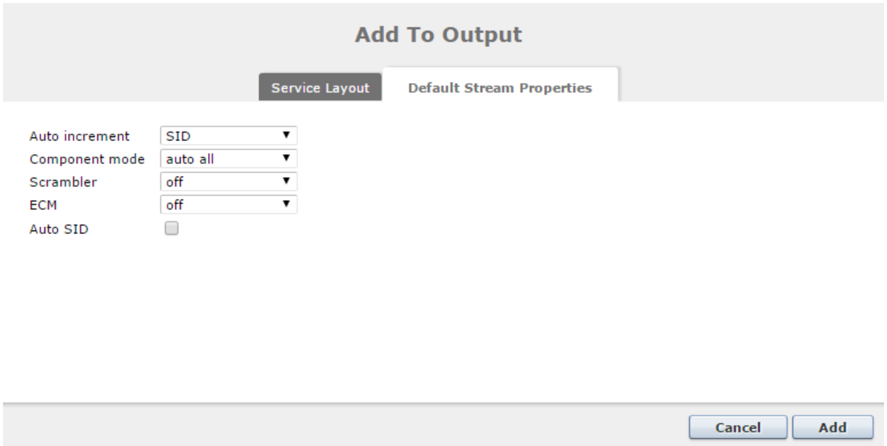
8.1.1.2 Configuring MPTS using bulk selection

When performing a drag-drop operation of multiple service to an output MPTS, you will be presented with the following dialog box which will allow you to add these multiple services to the MPTS.



The following information is available on Add to Output: Service layout

Service Name	Names of multiple services selected
Service ID	Service IDs of multiple services selected



The following information is available on Add to Output: Default stream properties

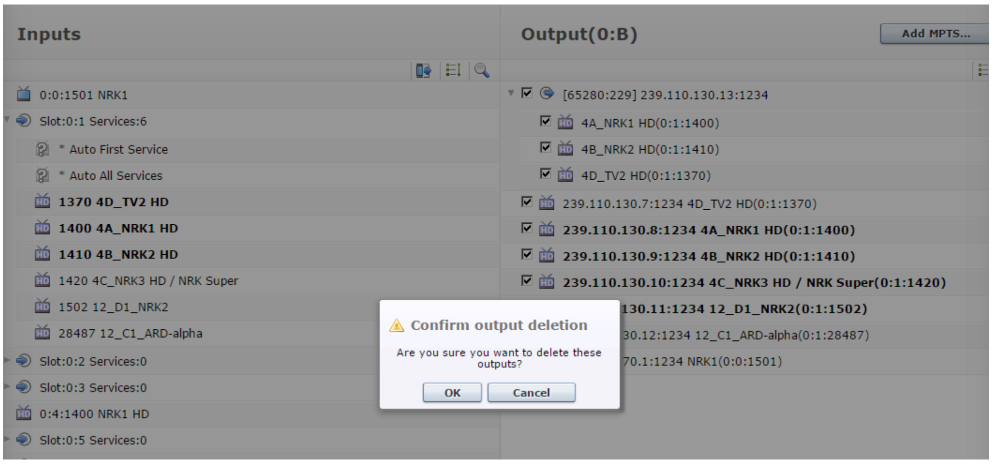
Auto increment	Auto increment by SID
Component mode	Component mapping rules
Scrambler	Selection of scrambler if any
ECM	Selection of ECMs if any
Auto SID	Enable Auto SID

8.1.1.3 Edit from output view

In order to edit, the user can open the edit pop-up with both double-click and **'Edit'** button on the right (typically a pencil icon).

8.1.1.4 Bulk deletion from output view

You can delete multiple service from SPTS or MPTS by selecting these using either standard shift key or control key and then pressing 'DEL' or dragging these to the Input pane.



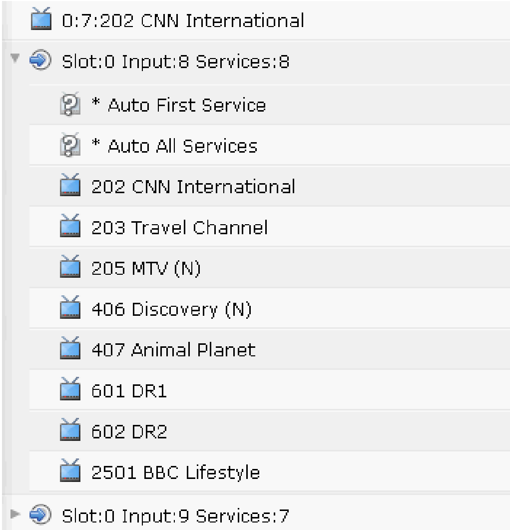
8.2 Auto Service Modes

The Auto-Service modes are available to automate the process of adding services to the output. I.e., instead of manually selecting a service from the input, the user instructs the system to add services from the input automatically.

Two implementations of the auto-service exist:

- Auto-First Service
- Auto-All Services

These modes are available for each input port when expanded, ie:



These "services" can be added to the output in the same way as regular services, and can be used in the following ways:

Auto-First Service will map the first available service in the input port. This feature is intended for VOD, where the source never will contain more than one service. In this mode the output service can be changed and edited like any other output service. I.e the service name can be changed; the component/PID mapping can be specified etc.

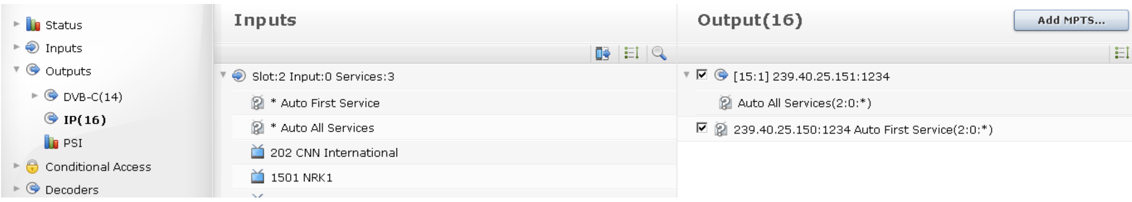
Auto-All Services will map all incoming services for the input port to an output. Here it is not possible to do any service editing at all. The service dialogs will be replaced with another dialog to block selected services.

8.2.1 Configuring an output with Auto All Services

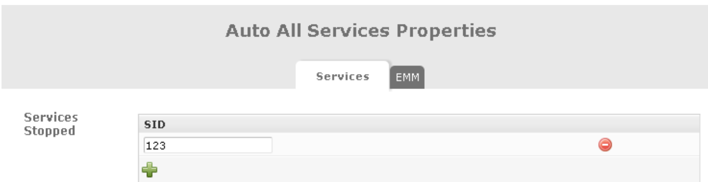
The Auto All Services configuration is done via drag-and-drop of the source "Auto All Services" to the output. The "Auto All Services" is then enabled for the given source.

With an "Auto All Services" configured the system will automatically add all these input port services to the output.

Note: It is not possible to add more than one "Auto All Services" per output.



It is possible to filter one or more services to be automatically removed by specifying the incoming service ID in the blocking list. This is available on the edit dialog of the output "auto-service" and can be accessed by double clicking on this.



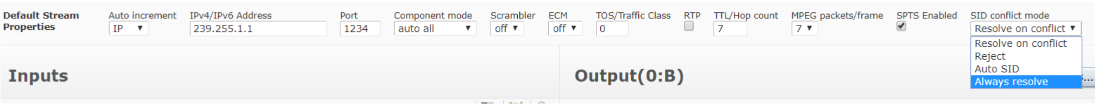
By removing the "Auto All Services" node all the services from that input will be removed.

In conjunction with an 'Auto All' service, it is possible to add additional local or other programs in the normal way, ie drag and drop to the MPTS node.

	Service ID clashes are not automatically handled when using a combination of 'Auto All' and additional services.

8.2.2 Configuring an output with SID conflict mode

It is possible to resolve SID conflicts on adding output with below methods.



Reject	This will reject the adding if one or more of the services has a service id which is already present in the MPTS
Auto	This will use the Auto-SID mode
Resolve on conflict	If one or more of the services has a service id which is already present in the MPTS, we will show the Service Id dialog.
Always resolve	It will always show the Service Id dialog when service(s) are added to a MPTS

8.3 Transport Stream Generation

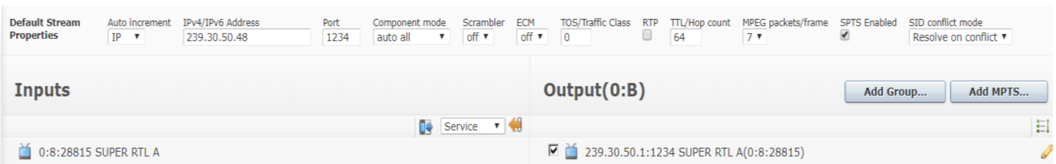
To begin generating MPTS outputs, we set the **Transport** related parameters via the **Edit Multiplex** [5]dialog, accessible by double clicking on the MPTS.

The procedure for adding services/multiplexes varies according to the type of module.

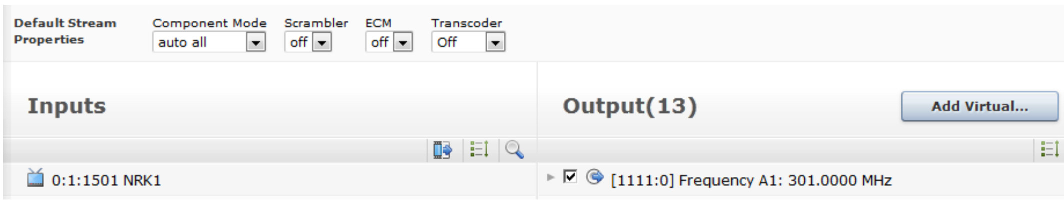
For non-IP modules, services are added to the output stream by dragging and dropping. This method is possible because entries in the **Output** panel already exist for these modules, corresponding to their physical ports. The **Default Stream Properties** panel for these modules is used for adding new services.

For IP modules, output multiplexes can be added by entering appropriate values in the **Default Stream Properties** panel and clicking **Add MPTS** (if MPTS license installed).

The figures below show the different Default Stream Properties panels for these modules.



5 For ASI, COFDM, and QAM modules, "Multiplex" is replaced with the module type.



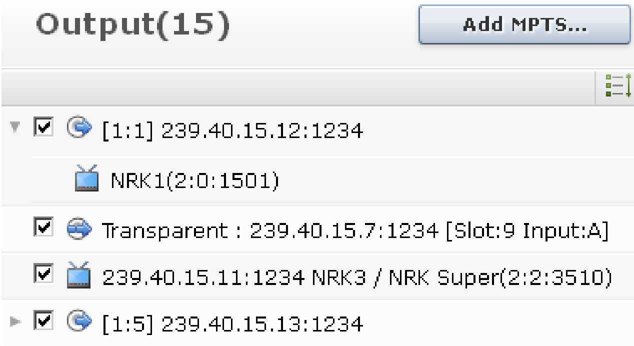
When creating an SPTS, the **Default Stream Properties** will be used and the IP address will be incremented.

	To add a unicast service, enter the destination port together with the destination IP address.

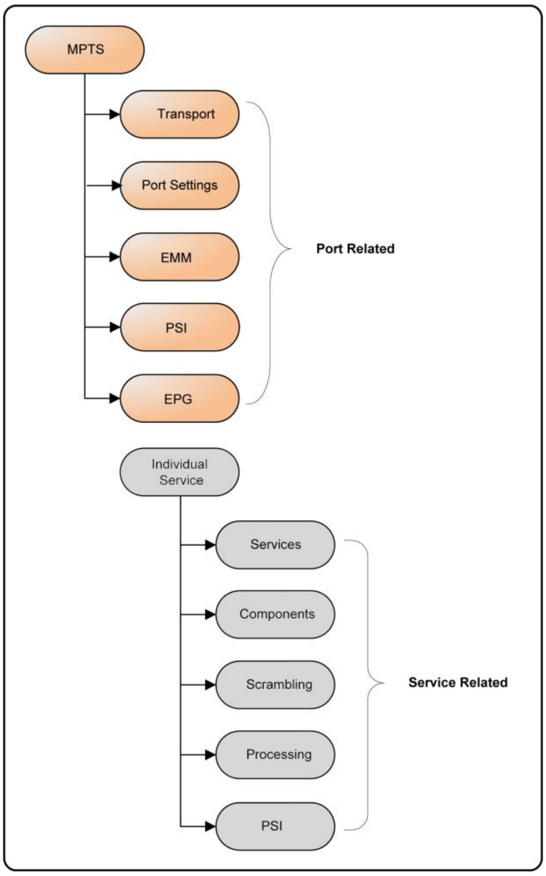
The following fields are available for **Default Stream Properties**; these fields vary depending on the module type:

IP	IP address of the SPTS/MPTS
Port	IP port number
Component Mode	PID forwarding mode: **auto all** – all components are forwarded **auto a/v** – only audio and video components are forwarded **auto a/v/ttxt** – audio, video and teletext components are forwarded
Scrambler	If a scrambler module is installed, it is possible to scramble the selected service by choosing one of the available scramblers from the pull down menu.
ECM	If scrambling has been selected, assign the output stream to the appropriate scrambled subscriber package
Transcoder	If a transcoder module is installed, it is possible to assign this to the new service.
MPEG Packets/Frame	Number of MPEG packets per UDP frame; default is 7.
Service Type	Specifies the Type-of-Service (TOS) value to prioritize between Delay, Throughput, and Reliability. Refer to the IP protocol specification for more details.
RTP	Enable Real Time Protocol, adds RTP header to the UDP packets.
TTL/Hop Count	Set the Time-to-Live (TTL/IPv4) or Hop Count (IPv6) value for the IP output packets. Default TTL value is 64.
SPTS Enabled	Enable SPTS output, streaming will start when enabled.

The properties of MPTSs and SPTSs are organized differently in the GUI to simplify the process of configuring and maintaining these streams.

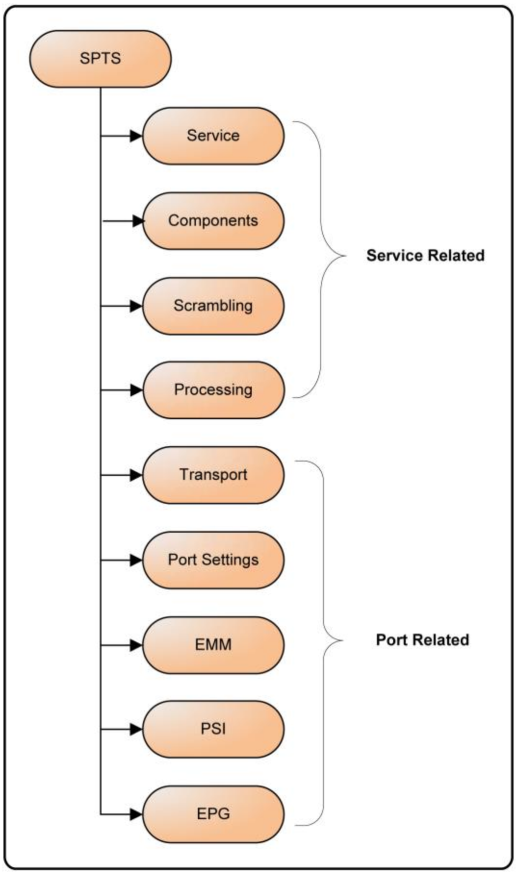


MPTSs can be expanded to reveal the individual services they encompass. An MPTS stream provides more PSI options compared to an SPTS. Both MPTS and SPTS provide the option to map through external PIDs which will not be signaled in the PSI.



Double clicking on an MPTS reveals port related settings (**Edit Multiplex** dialog); double clicking on an individual service inside the MPTS reveals service related settings (**Service Properties** dialog), as illustrated in Figure above.

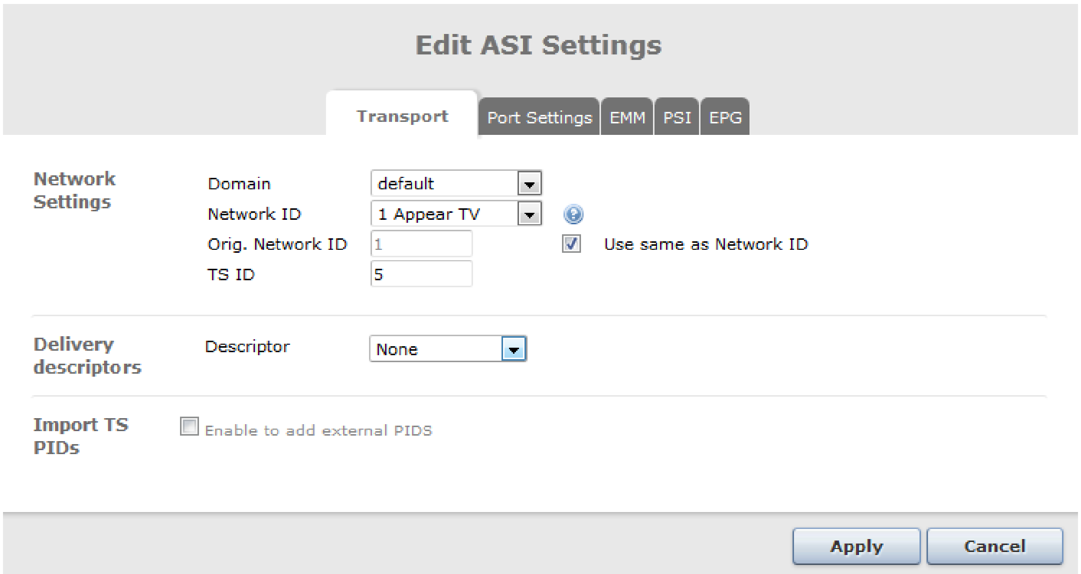
The figure below shows the layout of properties dialog for SPTS. Double click on an SPTS to access its properties. The tabs available for both MPTS and SPTS properties are almost identical; wherever there are differences, they are pointed out in the text.



The SPTS output is only supported by the IP output module

8.3.1 Transport Settings

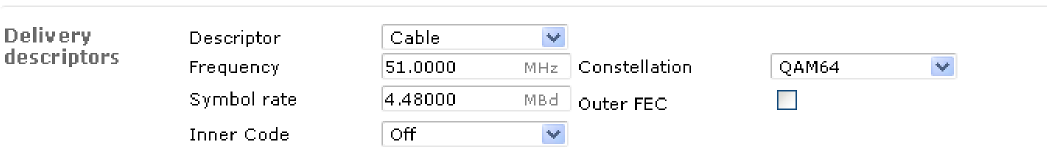
The generic **Transport** tab for all output modules contains the **Network ID, Orig. Network ID** and **TS ID** fields as well as the **Import TS PIDs** checkbox. For IP and ASI output modules, the tab holds the additional **Delivery Descriptors** panel as well (described in the following subsection).

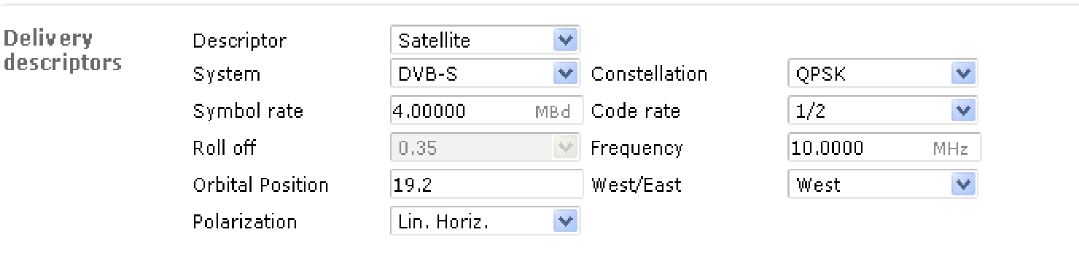


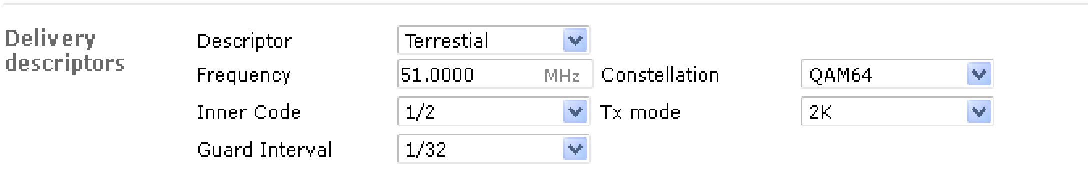
Domain	If a domain has been configured, an additional drop down box will be visible. Refer to o for information on how to add a domain.
Network ID	Network identification selector
Orig. Network ID	Original Network identification tag. To disable, check **Use same as Network ID**.
TS ID	Transport Stream identification tag

8.3.1.1 Delivery Descriptors

If the MPTS stream is to be converted to another network type modulation further down the signal chain, it is possible to add Cable, Satellite or Terrestrial parameters, which will then be added into the NIT. Select one of the three options under **Delivery Descriptors** from the **Descriptor** drop down box and enter the required parameters. The figures below illustrate the differences between the three options; correct values for these parameters can be obtained from respective network operators.

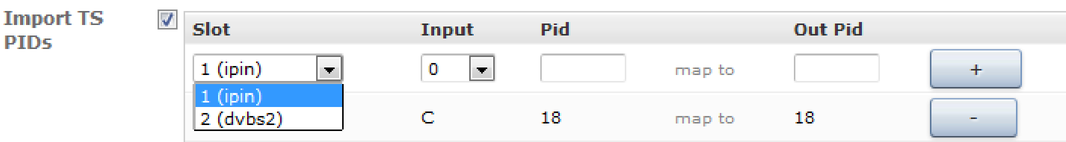






8.3.1.2 Import TS PID

Checking the **Import TS PIDs** on the **Transport** tab allows you to define PIDs to be manually added to the output transport stream. These PIDs will not be signalled in the PSI/SI. Click **+** to add additional PIDs and - to remove them.



Slot	Contains a selection of the available input modules

Input	Contains a selection of the enabled input ports on the corresponding slot.
PID	Input PID to be forwarded
Out PID	The input PID is mapped to this output PID number; each output PID occupies one channel through the output module like any other channel. The maximum number of channels through the output module is 250.

Manually mapped PIDs on outgoing Transport Streams are not checked for PID conflicts. These PIDs are not signaled in the generated PSI/SI table.

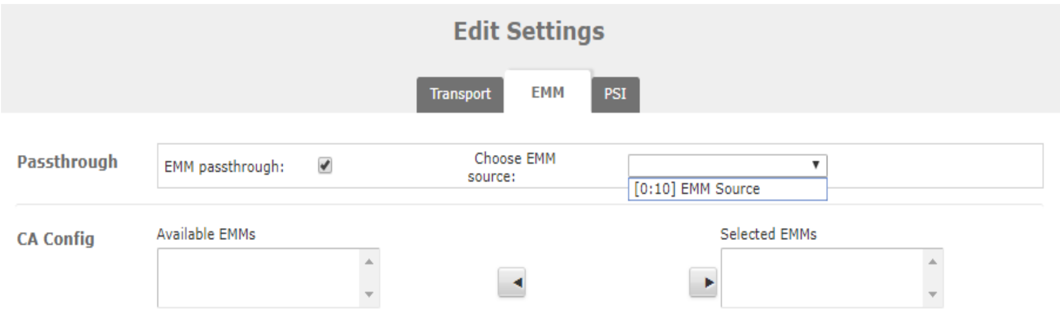
Importing PIDs is treated as a service by the system consequently reducing the number of services handled by the module with one.

8.3.2 Port Settings

The **Port Settings** tab is module specific and differs accordingly. Please see 8.4 for the specific output module settings.

8.3.3 EMM

The **EMM** tab makes it possible to add EMM streams inserted by the CA server via the unit's scrambling module - if one or more scrambler modules are present in the unit- by selecting the desired EMM(s) from **Available EMMs** and clicking on the appropriate arrow to move it to **Selected EMMs**.



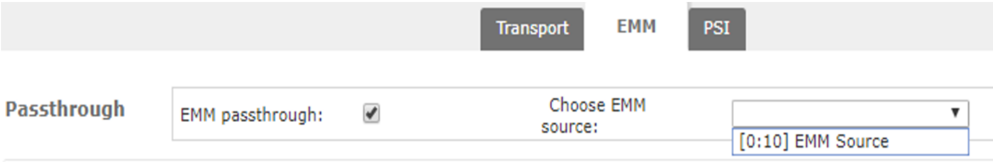
Available EMMs	A list of EMMs received from the CA server via the unit's scrambling card, configurable under: **Conditional Access → SCS → EMMG/PDG**; multiple EMMs may be added.

Additionally, there is a **Passthrough** option.

For IP SPTS, only the option to enable it will be available, as shown in the figure below.

Activating this option will enable an incoming service to be transmitted with its original CA including EMM and CAT without being descrambled in the unit, so that receivers further down the chain can carry out the descrambling process instead

For IP MPTS and any other output module, the **Passthrough** option will require also to select from which input the EMM will be passed through in the "**Choose EMM Source**" drop-down menu, as shown in the figure below:



The EMM(s) and CAT present in that source will be imported into the output MPTS.

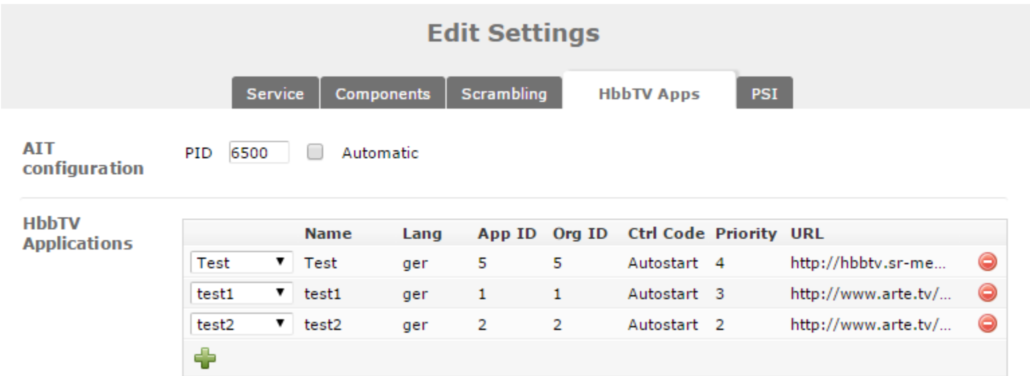
EMM Passthrough	For IP SPTS, enables an incoming service to be transmitted with its original CA including EMM and CAT without being descrambled in the unit, so that receivers further down the chain can carry out the descrambling process instead. For output MPTS, passes the EMM(s) and CAT present in the selected EMM Source into the MPTS.
Choose EMM source	Drop down list is available if you have any EMM source in the Mux.

!	When passthrough is enabled, the internal generation of the CAT table is automatically disabled.

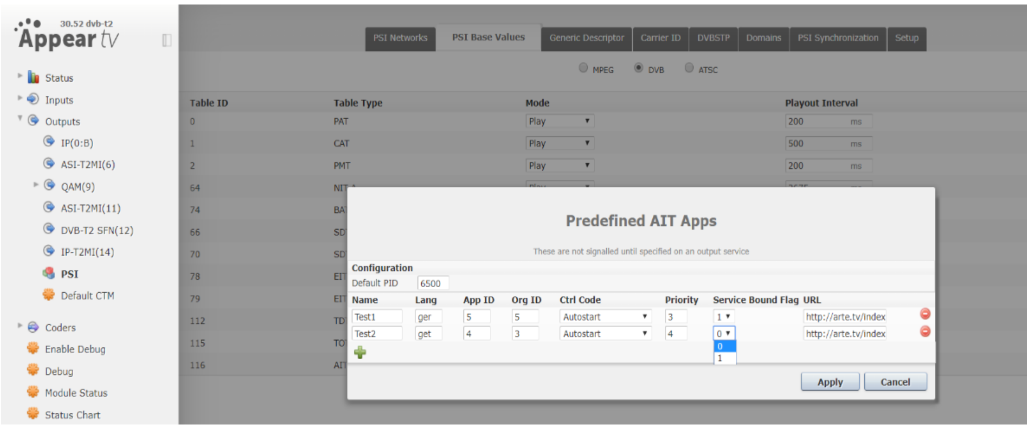
8.3.4 HbbTV Apps

On the HbbTV Apps tab, one or more HbbTV applications can be configured. These applications will be signaled on the output AIT table for the selected service.

When you configure an application, please note that you can only use URLs to specify the location of the content.



User can also access from Output->PSI-> PSI Base Values -> Edit AIT



AIT Configuration:

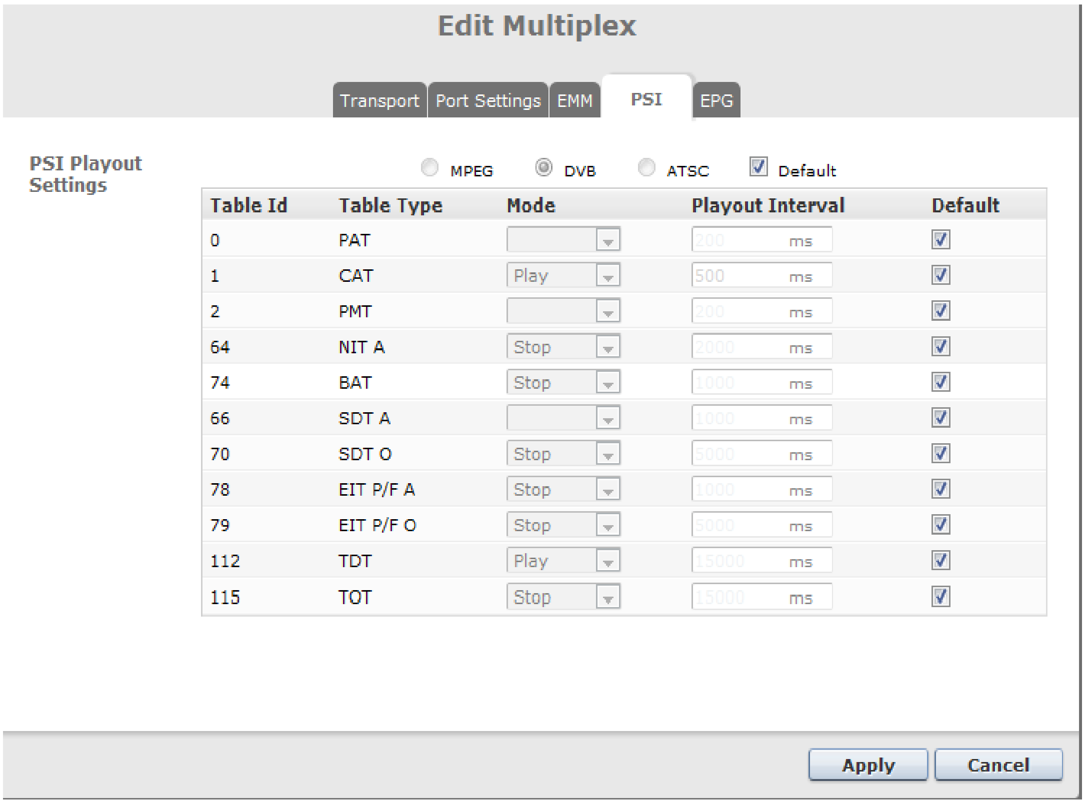
PID	Specify PID for AIT or configure Automatic.

Hbbtv Application:

Name	Specify the name of HbbTV App
Lang	Specify the Language
App ID	Specify the App ID
Org ID	Specify the Org ID
Ctrl Code	Choose any of the below Ctrl Code • Auto start • Present • Destroy • Kill • Prefetch • Remote • Playback auto start
Priority	• Specify the priority
Service Bound Flag	Specify the value for the Service Bound Flag
URL	URLs to specify the location of the content.

8.3.5 PSI

The **PSI** tab allows the base values defined in the **Outputs->PSI** node to be overwritten for each specific output stream. The list in the table reflects the currently selected mode: **MPEG**, **DVB**, **ATSC** or **Default**.



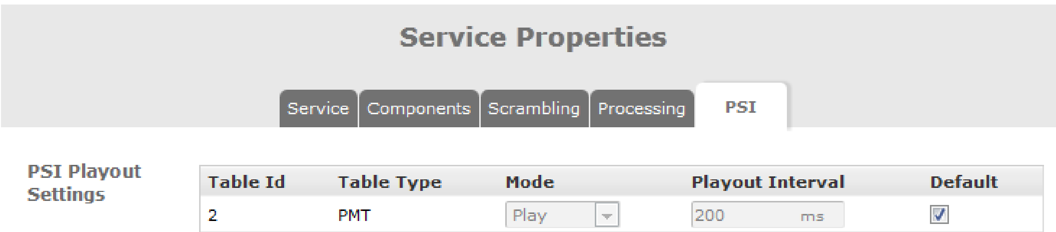
To modify any of the base values (default values), disable **Default** and set the values as needed.

If the change in base value is applicable to all outputs, it is simpler and neater to change it from the **PSI** node in the **Navigation Pane**, where the base values are configured. A change in the base value from this page will automatically propagate to all outputs applicable.

The **PSI** tab is identical for both MPTS and SPTS.

8.3.5.1 PSI configuration for services in an MPTS

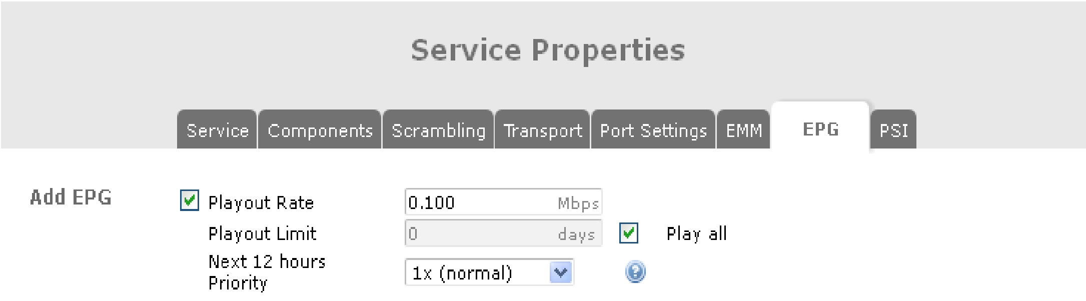
Individual services within an MPTS have a PSI tab that allows for the PMT's Mode and Playout Interval to be modified.



If the Global PMT (accessible via **Outputs → PSI**) mode is set to **Stop**, PMTs for services within the MPTS will not be played, regardless of their mode.

8.3.6 EPG

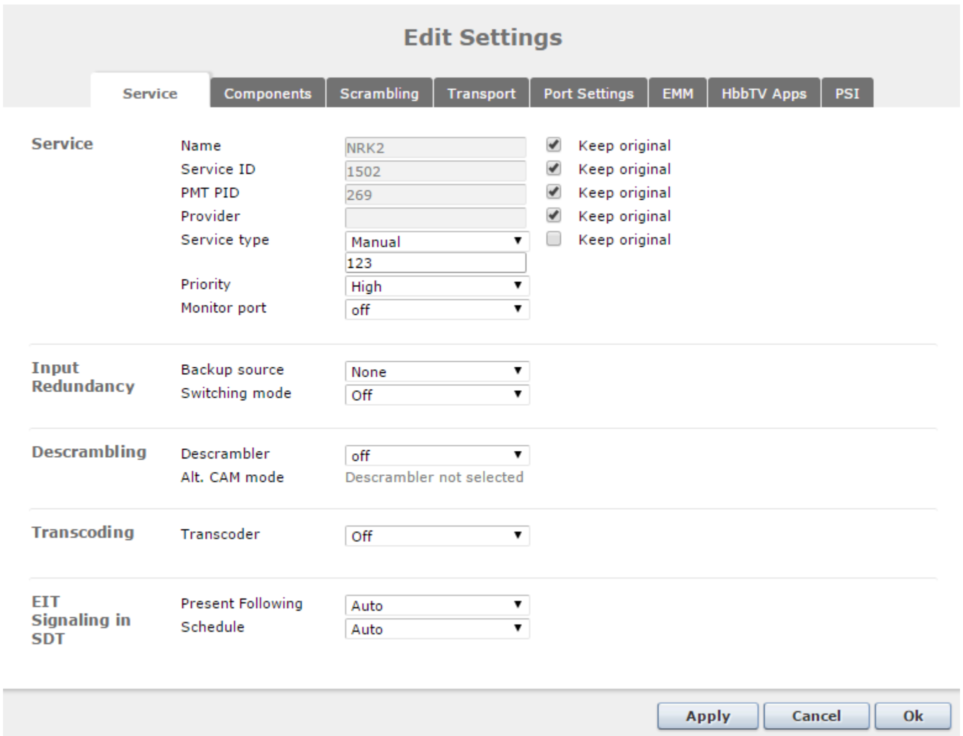
The **EPG** tab enables transmission of EIT schedule information on a particular output stream, if an EPG module is installed. Further information on these parameters is available in Section 11.3.



The **EPG** tab is identical for both MPTS and SPTS.

8.3.7 Service

To modify the settings for individual services, double click on the service and the **Service Properties** dialog will be displayed. The **Service** tab is identical for both MPTS and SPTS.



The following parameters are available for configuration:

Name **Service Id** **PMT PID** **Provider**	By default, these four values are extracted from the incoming streams automatically. They can be overwritten manually by deselecting **Keep Original** and entering a new value. If a manual Service Type is selected, this value must be specified.

Service type	
Priority	An internal system parameter which may be used for different purposes. Currently it is an attribute used by the Output Redundancy system only.
Monitor Port	Provides a way to monitor a service if the system is configured with a decoder module. If enabled, a copy of the service is sent to the selected decoder. If the service is descrambled, the service is copied after descrambling.

Refer to the Input Redundancy (Section) for more information on the **Backup source** and **Switching mode** parameters.

Descrambler	Select which descrambler to be used for removing the incoming encryption. If multiple services are being descrambled, they must originate from the same input port (same MPTS).
Alt. CAM mode	Configuration of these values is moved to the main conditional access page in the **Navigation Pane**.

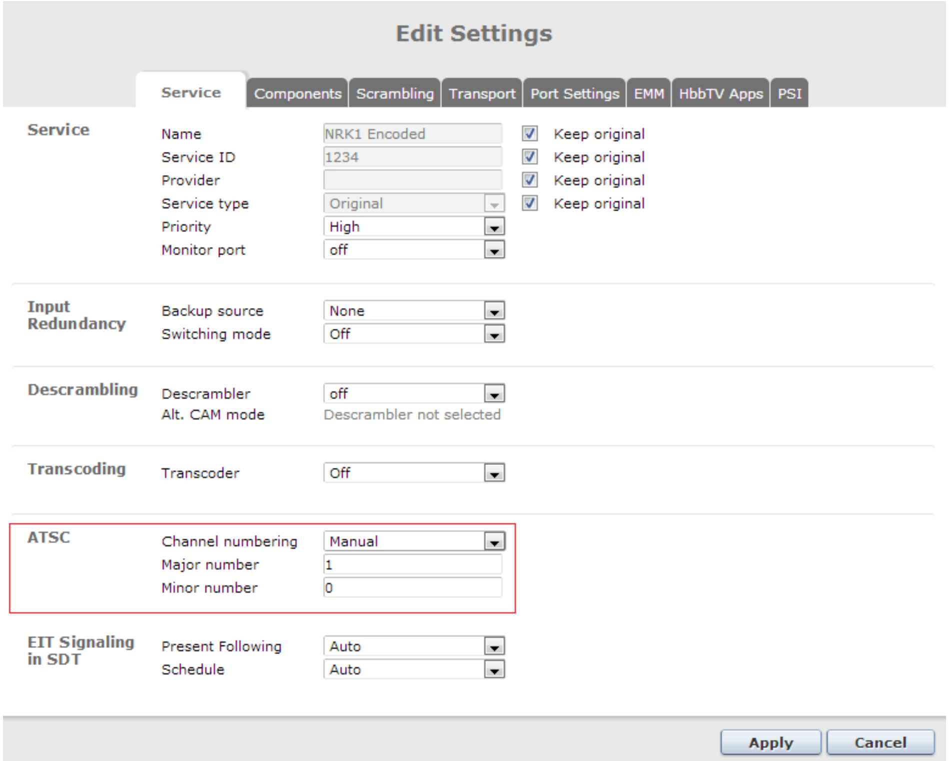
Transcoder	If there is a transcoder module available in the unit, this will allow you to allocate the service to an available transcoder port.

For each outgoing service, it is possible to manually set the signaling of EIT Present Following or Schedule in the SDT:

Present Following	Choose one of the following: • Auto – If the EIT table configuration on the PSI page is set to Play or Pass, then the SDT flag is set to 1. Otherwise, it is set to 0. • Present – the EIT present/following flag in the SDT is set to 1 • Not Present – the EIT present/following flag in the SDT is set to 0
Schedule	Choose one of the following: • Auto – If the EIT table configuration on the PSI page is set to Play or Pass, then the SDT flag is set to 1. Otherwise, it is set to 0. • Present – the EIT schedule flag in the SDT is set to 1 • Not Present – the EIT schedule flag in the SDT is set to 0

If an EPG module is available and the schedule is enabled on the output, then both Present Following and the Schedule flags are set to 1 in the SDT.
For each outgoing service, it is possible to manually set the Major and Minor channel number if **ATSC** profile is active for corresponding transport stream.

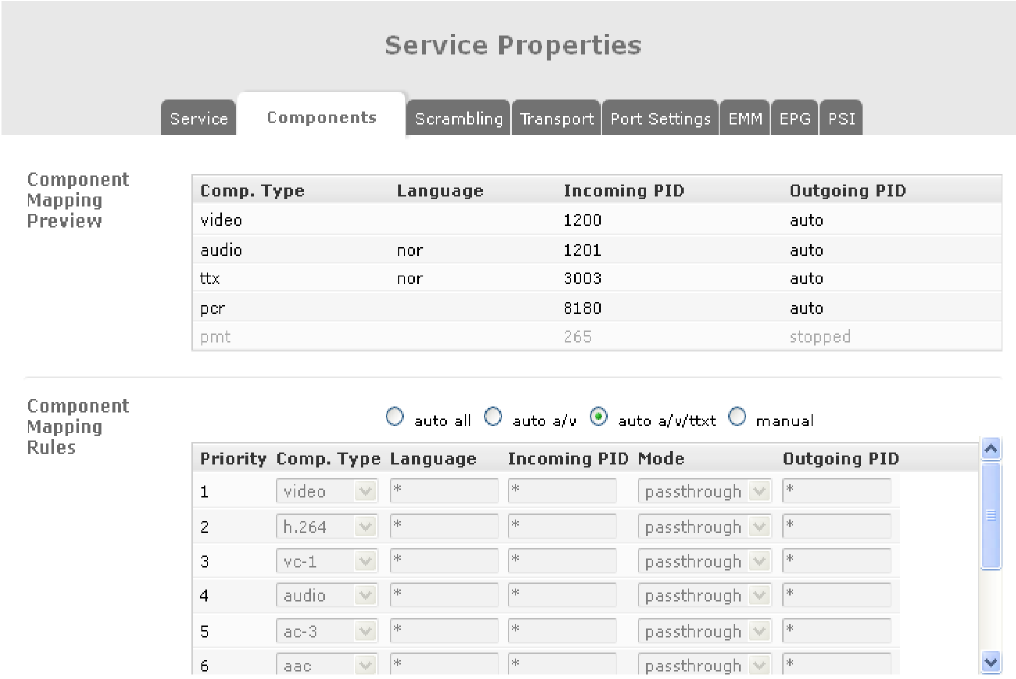
If "Channel number" is set to "Auto" the numbers will be copied from the input TVCT/CVCT tables. In "Manual" mode the values are entered in the GUI.



Channel numbering	Choose either **Auto** or **Manual**
Major number	The major number must be in the range [1, 1023]
Minor number	The minor number must be in the range [0, 999]

8.3.8 Components

The **Components** tab allows for the mapping of components through the unit, i.e. video, audio, etc. This mapping includes manual and automatic modes. The **Components** Tab is identical for both MPTS and SPTS.



The following mapping modes are available:

Auto All	All PIDs will be mapped to the output
Auto A/V	Only Audio and Video PIDs will be mapped. If multiple Audio PIDs are available on the inputs, all will be mapped through.
Auto A/V/TTXT	Audio, Video, Teletext and DVB Sub PIDs will be mapped. If multiple Audio PIDs are available on the inputs, all will be mapped through.
Manual	It is possible to define your own custom filtering and mapping rules to get the desired output. Refer to the detailed description below.

8.3.8.1 Manual Mapping

In **Manual** mode it is up to the user to define the mapping rules for the components of the outgoing service. Each outgoing PID requires a dedicated rule; otherwise the default rule applies.

A component-type PID mapping mode can be set, i.e. the input component type is used to identify the input PID itself, instead of using the input PID value only. This feature is typically used to provide a fixed PID line-up at the output, even if the input PID values are changing dynamically at the input.

To achieve component-type PID mapping, a set of mapping rules are applied to the incoming PID which matches a specific filter. Several rules/filters can be added, and one PID may match more than one rule. However, only one rule (the one with the higher priority) will be applied to the mapping of the PID.

For example:

Input	Output
Daytime	
501 (Video)	600 (Video)
502 (Audio, nor)	601 (Audio, nor)
503 (Audio, swe)	
510 (TTX)	
Evening	
501 (Video)	600 (Video)
502 (Audio, eng)	601 (Audio, eng)
505 (TTX)	505 (TTX)

A set of rules fulfilling this purpose would be:

Input	Component Type	Language	Incoming PID	Mode	Outgoing PID
1	mpeg-audio	nor	*	REMAP	601
2	mpeg-audio	eng	*	REMAP	601
3	mpeg-video	*	*	REMAP	600
4	ttx	*	505	PASSTHROUGH	*
Default	*	*	*	STOP	*

The default rule will in this example stop the input PID 503 as no rule finds a match. Also the TTX PID will be stopped during daytime as the input PID does not match the PID based rule.

With many rules potentially being active at the same time, it may be hard to foresee the result. Consequently the GUI reflects the evaluated output PID line-up dynamically as the rules are defined.

The following manual mapping modes are available:

Stop	The input component referenced will be stopped
Remap	The input component referenced will be remapped to a specified output PID – this PID will <u>not</u> be reallocated by the system to prevent PID clashes.
Passthrough	The component will be mapped to the same output PID as its input PID – this PID may be reallocated by the system to prevent PID clashes.

In systems with dynamic behavior on the input, it is recommended to create a rule for all PIDs to be added to the output if a fixed and dedicated line-up is required. This way, it is easier for this system to decide what action to take when the input changes. In some cases, a lack of definition will force the system to temporarily stop PIDs.

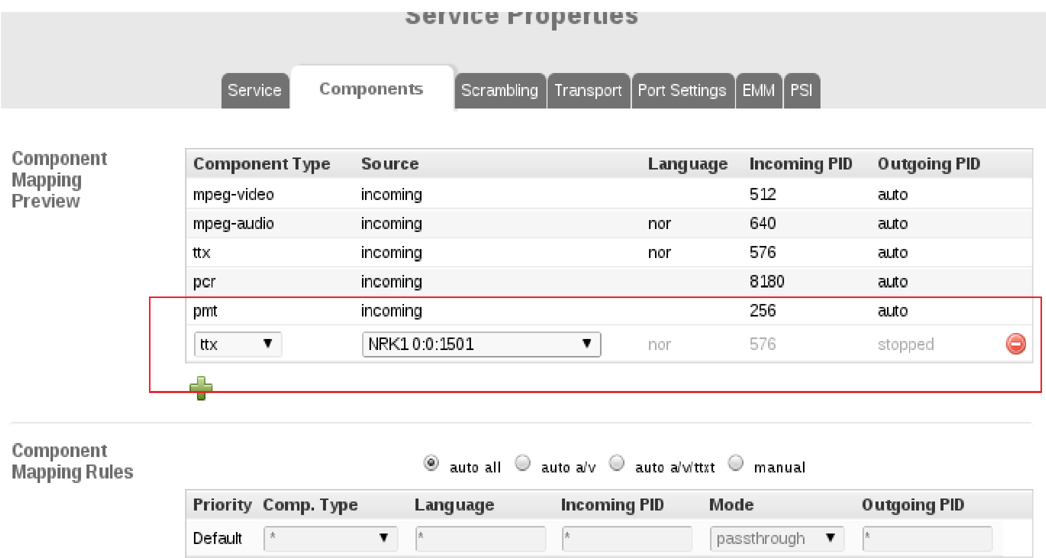
For example, a TTX PID in Passthrough mode changes on the input to a PID value already assigned manually on the output. In this case, the PSI system will stop the signaling of that TTX PID until the system has decided what to do with the TTX PID – i.e. automatically map it to a new, free PID value.

	In an output service, if a video PID with PCR is stopped then this will be stopped on the output, but the PCR can be extracted and output. This can be used in cases where you would like to create a radio service using a PCR from a signaled video PID in the service.

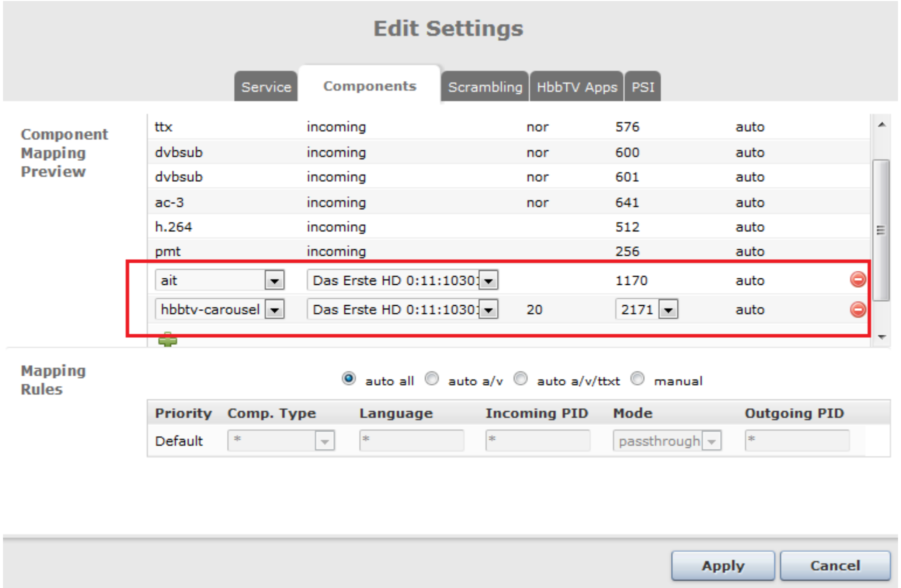
8.3.8.2 Component multiplexing

With Service component multiplexing it is possible to add a Audio, Teletext, DVB Subtitle, AIT, HbbTV-carousels or private component from another input source to an outgoing service. This PID will be multiplexed into the outgoing stream and signalled in the PMT of the service.

Adding components to an outgoing service is done on the Components Mapping section by clicking the plus button. This will show a selection dialog where all valid Audio, Teletext, DVB Subtitle, AIT, HbbTV-carousels or private PID that can be selected for output.



	Any input Audio, Teletext/DVB Subtitle source that is not synchronized with the output video (ie PTS) could possibly have issues with display. Users must ensure that the added component is synchronized for this feature to be enabled correctly. If the PID is not synchronized with the output video, no alarms will be raised.

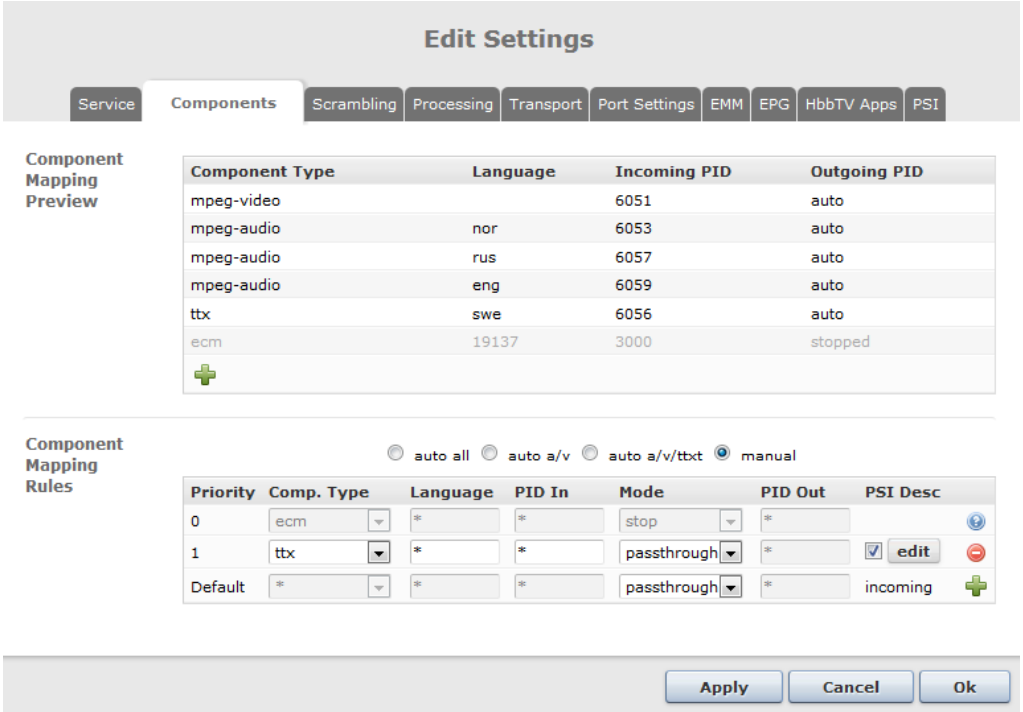


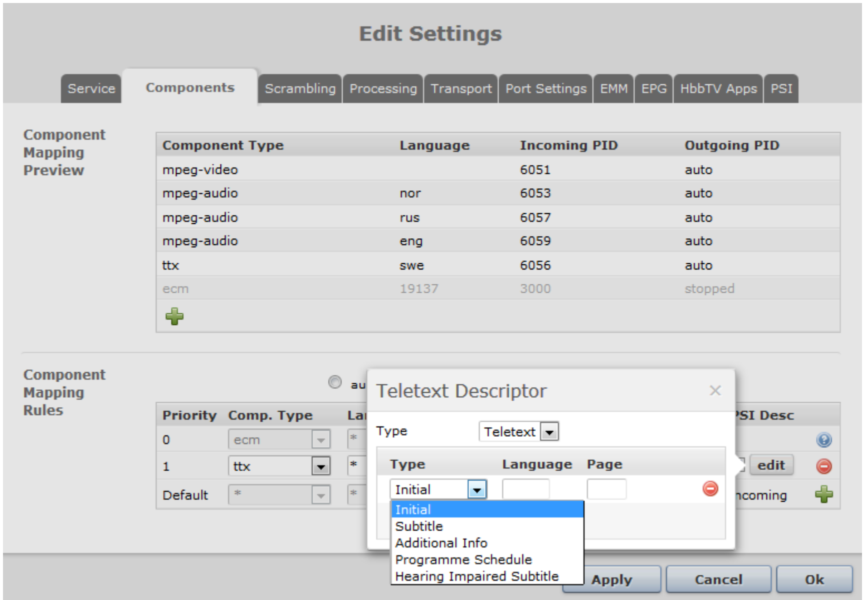
8.3.8.3 Component mapping for Teletext descriptors

When adding a manual component mapping for Teletext components, it is possible to override the teletext descriptor and create a new description for the PMT.

The following mapping modes are available on after enabling the PSI override and clicking the 'edit' button:

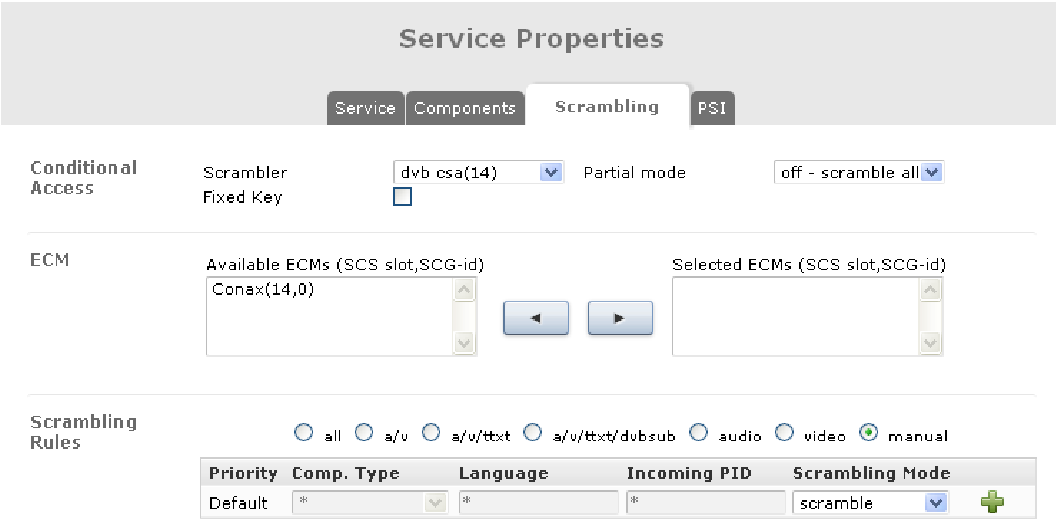
Type	Specific type as Teletext or VBI data.
Type of Teletext	Specific type as Teletext • Initial • Subtitle • Additional Info • Programme Schedule • Hearing Impaired Subtitle
Language	Specific Language for teletext descriptor.
Page	Specific page number for teletext descriptor.



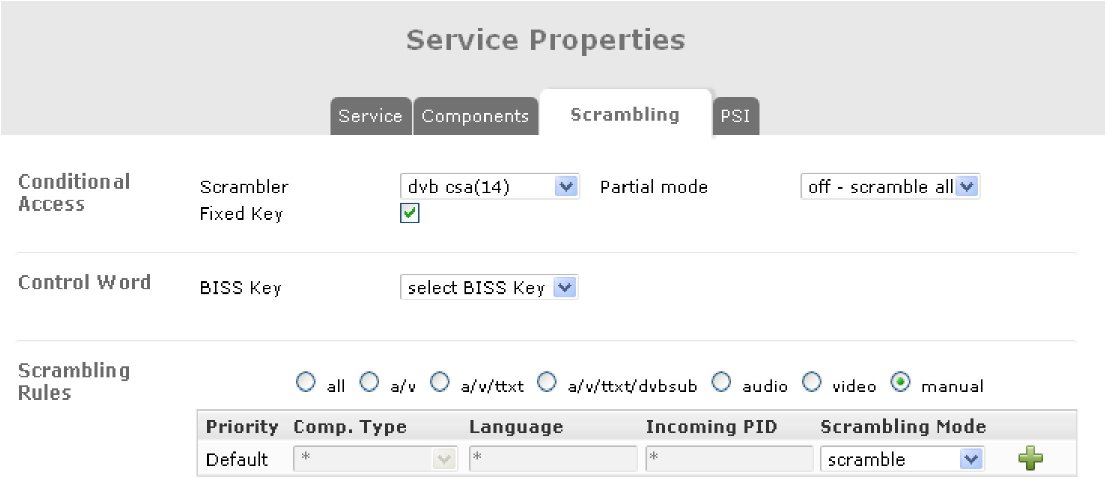


8.3.9 Scrambling

The **Scrambling** tab handles all aspects of encryption apart for the EMM which is handled by a separate **EMM** tab (Section 0).



Scrambler	The scrambler card to be used for the scrambling of this service
Partial Mode	Defines the percentage of the packets to be scrambled. A service which is partially scrambled requires less processing capacity for the receivers.
Fixed Key	Enables BISS scrambling Contents of the Scrambling tab will change accordingly (see figure below) with the **ECM** section being replaced by the **Control Word** section.
Available ECMs	A list of predefined ECMs – select which ECM to use for the encryption. Multiple ECMs may be selected but only if they are defined with the same CW, i.e. they are created with the same SCG_ID. When an ECM is selected, all ECMs not containing the same CW will be tagged red, and will not be selectable.
Scrambling Rules	Specifies which component types to scramble • all – automatic for all components • a/v – audio and video only • a/v/ttxt – audio, video and teletext • a/v/ttxt/dvbsub – audio, video, teletext, and DVB subtitling • audio – audio only • video – video only • manual – set the scrambling rules manually

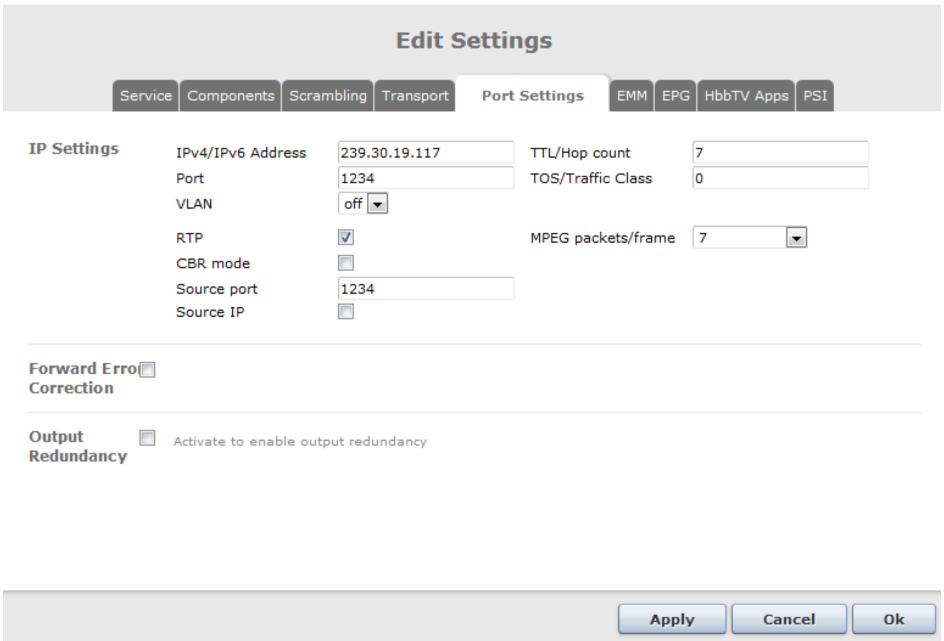


BISS Key	Lists all BISS keys available.

8.4 Output Port Settings

8.4.1 IP Output module

The following parameters: **IP**, **Port**, **RTP**, **Time to Live**, **Type of Service** and **MPEG packets/Frame** are populated based on the values given in **Default Stream Properties** panel (see Section 8.4). The remaining parameters: **Rate [Mbps]** and **Source Port** are described below.



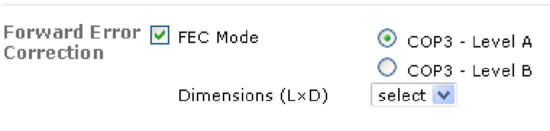
Rate (Mbps only)	Total CBR output rate

CBR Mode (SPTS only)	Enables an SPTS output to be sent with constant bit rate.  Enter the desired output rate. If the service exceeds this rate, the system will report an output buffer overflow alarm and drop the packets.
Source Port	The IP source port of the output multicast. In an Output Redundancy configuration, this value will be replaced with the virtual source address.
Source IP	The source IP address override feature allows configuration of the source address of an IP output multicast or unicast to any IP address. If no value is set, the address of the data port is used.
VLAN	Displays available VLANs; the default value is off. Select a suitable VLAN if required.

Refer to Section 8.3 for details on the parameters for **Port Settings**.

8.4.1.1 Forward Error Correction (FEC) Related Parameters

If the IP output module contains the Forward Error Correction (FEC) license, the Port Settings tab will contain FEC parameters. This feature can be enabled with the **Forward Error Correction** checkbox, the following parameters will appear.

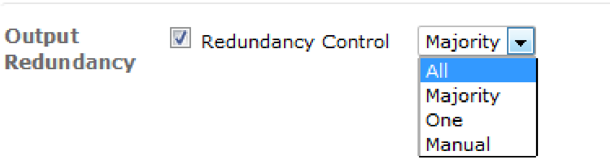


The following parameters are available:

FEC Mode	FEC mechanism can be used to correct errors that occur during transport. Choose either one: • COP3 – Level A: Use FEC Columns only (protects again burst loss) • COP3 – Level B: Use both FEC Columns and Rows (provides additional protection against Random Packet Loss) A FEC Matrix is generated and transmitted on two separate UDP ports: • FEC columns on UDP Port +2, and when using level B: • FEC Rows on UDP Port +4. When FEC is enabled, it is important that the UDP ports reserved for the FEC system is not occupied by other traffic.
Dimensions (LxD)	The FEC matrix, L=Columns, D=Rows; value ranges from 1 to 20.

8.4.1.2 Output Redundancy Related Parameters

The Output Redundancy fields are to be used in a system configuration where two IP modules or services are configured in a redundancy scenario. Refer to Section 12.4 for further details.



The following parameters are available:

Redundancy Control	Provides the criteria for when to disable the output. Choose from: • All – Output TS is disabled if all services are in error • Majority - Output TS is disabled if majority of services (with high priority) are in error • One - Output TS is disabled if one service is in error • None - Output TS is not automatically controlled

Please note that Source IP needs to be enabled and configured correctly if Output Redundancy (OSPF) is enabled.

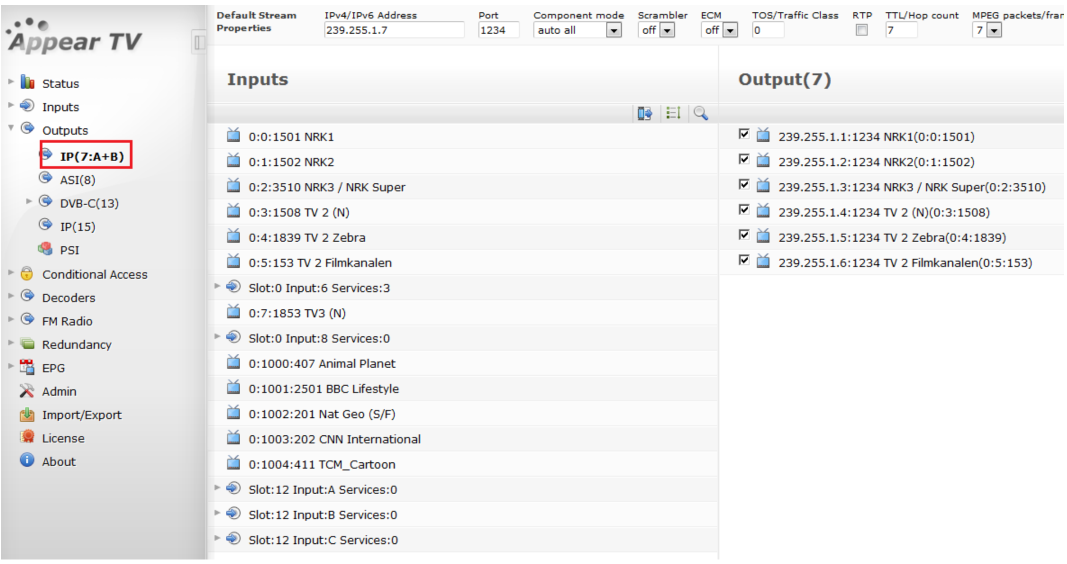
8.4.1.3 Port Settings for IPv6 output

For IP output modules with IPv6, the Port Settings tab is shown below. When using standard

IPv6 address syntax (128 bits, ':' instead of '.'), the GUI will interpret the address as an IPv6 address.

8.4.2 Cloned IP Output Module

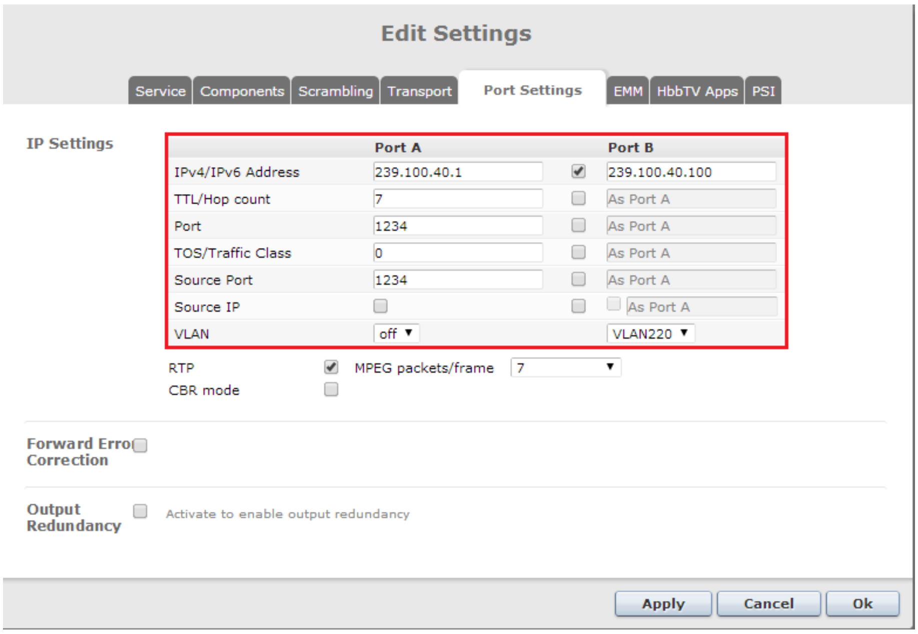
The Cloned IP Output module has two physical data ports which both contain the same output represented by one internal port. Service configuration is performed to the internal data port, and the same service is then output on both physical data ports.



Configuration of the output streams and ports are similar to that of the standard IP output and these details are shown in 8.4.1.

8.4.2.1 Unique Configuration on two ports

IP settings can be configured different on the two IP ports in cloned output mode. Parameters that are able to be changed, can be selected and the new value entered. By default, the properties of port A are used.



8.4.2.2 Exclusive Output Port Mode

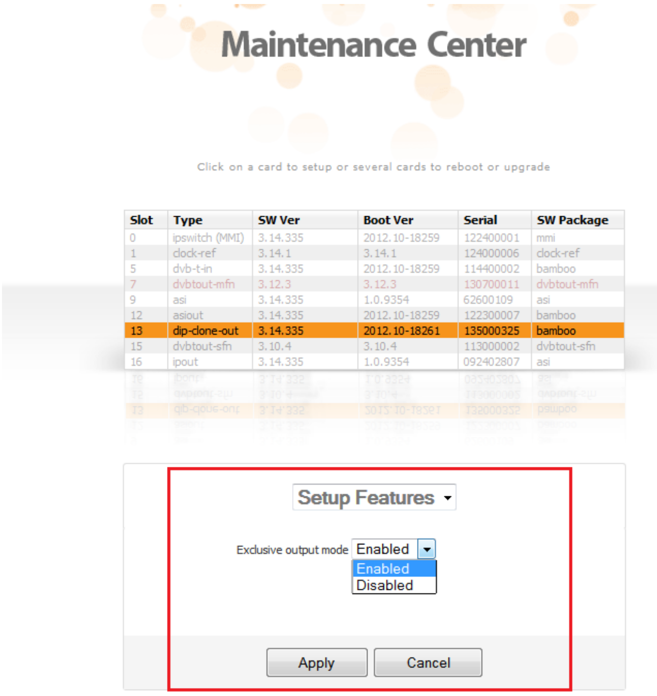
While in Cloned IP output mode, it is possible to enable Exclusive Output in which the following rules are followed:

Link on both ports (Default)	Port A is active Port B is inactive (ie no output bitrate)
Link on B port only (link down on A port)	Port A is inactive (link down) Port B is active
Link on A port only (link down on B port)	Same effect as default

When the module is in exclusive output mode only one port is outputting transport streams at once. If link is down on one port, the other port will take over.

Where port A is the default port and port B is a backup, used only when port A has link problems. When link of port A comes back, the system will switch back to use port A (ie reverting)

In order to enable Exclusive Output Port, the Cloned IP Output module must first be changed to this mode. This is configured in the Maintenance Center and you can find further details on this procedure in the Upgrade Guide.



When this feature is enabled this will be displayed in the **Redundancy->Output Redundancy** status page.

Output Redundancy Status

Slot	Module	Type	State	Redundancy Options
0	B	ipswitch		Edit Slot 0...
3		dip	Exclusive output	Edit Slot 3...

8.4.3 Dual IP Output

The Dual IP output module allows two individual output interfaces to be connected to network sources, but for the system, this is exactly as two IP output cards. The output streams can be either SPTS (VBR or CBR mode) or MPTS.

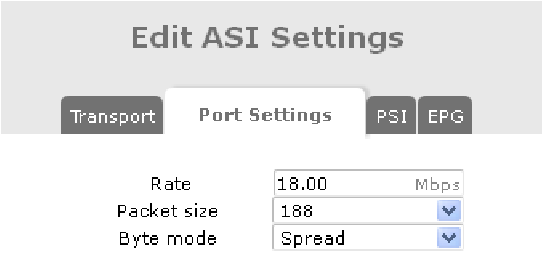
All function and status normally associated with IP output modules are present but the total Output Bitrate for both IP ports cannot exceed 850 Mbps or 250 services, ie the limit is shared between the two ports.

Outputs

Slot	Type	Services	Tot Rate	Max Rate	Min Rate	CC Errors	ATV CC Errors	Output Rate	Used Ports
0	ipswitch	7	42.996			0	0	91.192	7/250
4	asi-t2gw	0	0.000			0	0	0.000	0/250
	Port A - PLP 0	0	0.000					0.000	
	Port B - PLP 0	0	0.000					0.000	
8	dip-out	90	454.840			0	0	476.124	90/250
8	dip-out	90	394.726			0	0	420.893	90/250
15	ipout	0	0.000			0	0	0.000	0/250

8.4.4 ASI Output Module

For ASI modules, the **Port Settings** tab is shown below:



An ASI output module can output up to four separate MPTSs. The ASI output configuration is similar to that of an IP MPTS output, except for a different **Port Settings** tab.

The following ASI parameters are available:

Rate [Mbps]	Total ASI output rate - the stream will be stuffed with NULL packets to maintain the correct fixed bit rate.
Packet Size	TS packet size (188 or 204)
Byte Mode	Byte mode specifies how the TS data is transported over the ASI link: **Burst Mode** – In burst mode, all TS-data-bytes are sent without any idle symbols in between. Maximum data rate in burst mode is 213 Mbps per port. **Spread Mode** – In spread mode, the ASI specification requires at least one idle byte between each data-byte, and each packet start indicator (0x47) is preceded with at least two idle bytes. The ASI output stream in spread mode guarantees that each data-byte is preceded with two idle symbols. This effectively reduces the maximum data rate to 1/3 of the maximum ASI output rate, i.e., (213/3) Mbps. If higher rates are required, use burst mode.

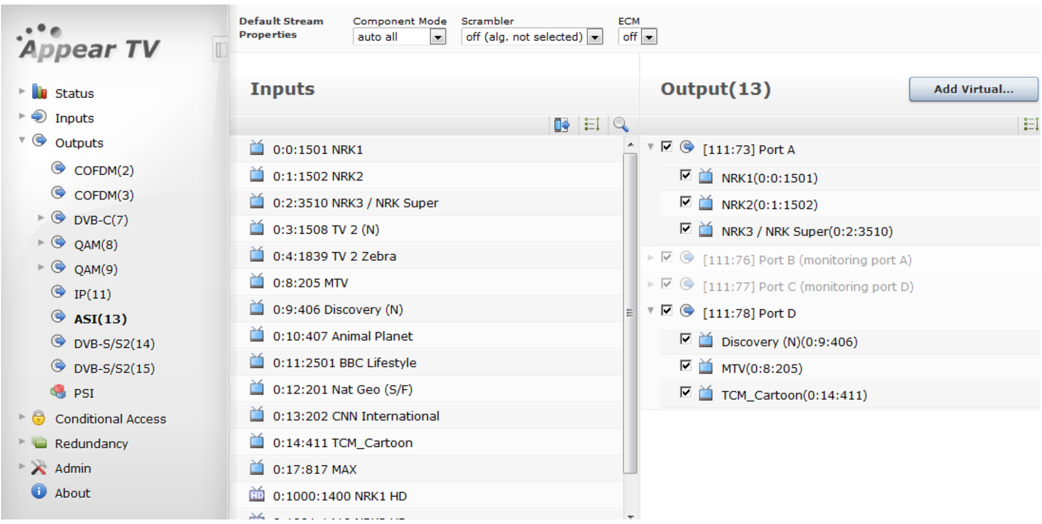
8.4.4.1 MIP Inserter for ASI Output

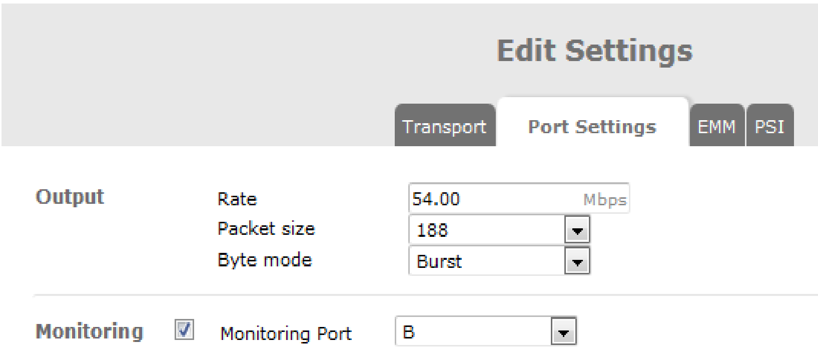
Please refer to the Terrestrial Solution Configuration Guide for more information

8.4.4.2 ASI Cloned Output

The ASI cloned Output mode allows you to set any available output port as a "monitor" port for an active one. Service configuration that is performed to the active port is then output on both physical ports.

In order to configure this, on the active port you can select the **Port Settings** tab. Here you have the option to choose an inactive port in which to be used as a monitor port. Once this setting is applied, the inactive port will not be able to be configured in the GUI, but will be a duplication of the active port.





8.4.5 QAM Output Module

Unlike other modules, the QAM module's **Port Settings** tab is not modifiable as the parameter values are set under **Outputs → QAM → Device setup.**

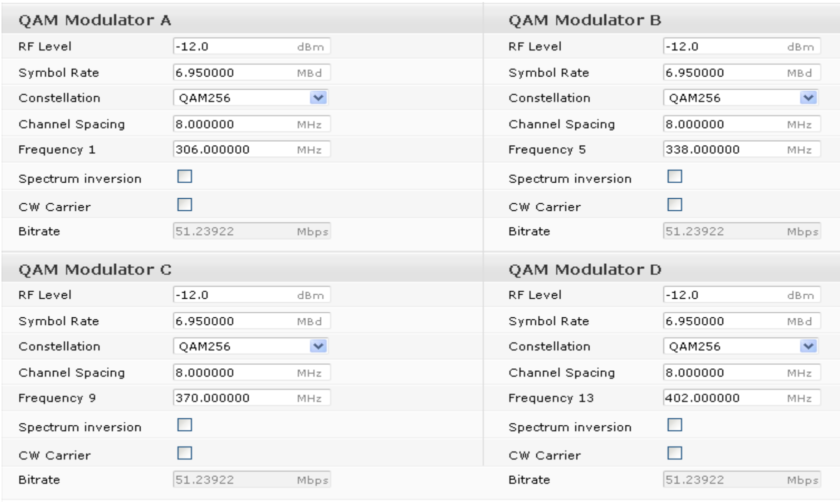
Although the QAM output has two physical outputs, it carries up to sixteen transport streams. Internally these streams are modulated by four block QAM modulators each carrying up to four channels.

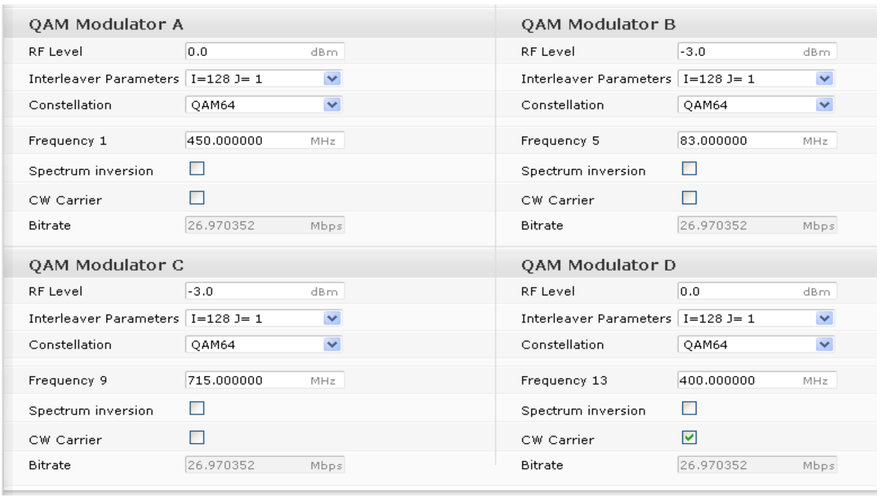
The RF connectors on the output are configured as such: the first two block modulators A and B, output on the port marked as **A+B**, the last two block modulators C and D output on the port marked as **C+D**.

The configuration of the QAM modulator parameters is available in a separate node in the **Navigation Pane**, called **Device Setup**, which is beneath each QAM output node.

The QAM module supports the ITU-T J.183/JCTEA standard where output several transport streams can be multiplexed into one transport stream using Time Division Multiplexing (TDM). Currently, this standard is supported for transparent streams only. To enable J.183/JCTEA support, simply click the corresponding check box.

When **Device Setup** is selected, both modulators can be configured from the resulting dialog. The figures below show the **Device Setup** node for Annex A/C and Annex B QAM modulators; correct values for these parameters can be obtained from respective network operators.





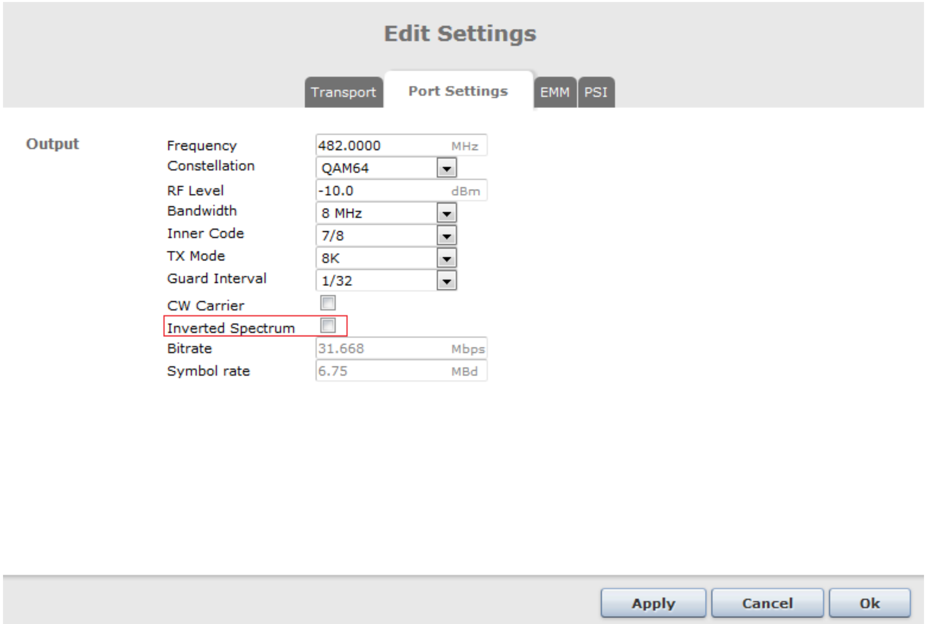
Listed below are the parameter limit-values for the QAM Output Module:

Annex A/C			**Annex B**	
Symbol rate	4.7 → 7.0 MBd		**RF Level**	-12 → +2.2dBm
RF Level	-12 → +2.2 dBm		**Interleaver**	I_{max} = 128 J_{max} = 16

Constellation	QAM16 → QAM256		**Constellation**	QAM64 & QAM256
Channel spacing	5 → 8 MHz			

8.4.6 COFDM Output Module

For COFDM modules, the **Port Settings** tab is shown below:



The COFDM output module outputs four modulated channels carrying one MPTS each. The module is equipped with two physical RF connectors: the first two channels A and B, output on the port marked as **A+B**; the last two channels C and D output on the port marked as **C+D**.

The **Port Settings** tab for a COFDM module allows for modulation settings of each individual channel to be modified.

The following parameters are available:

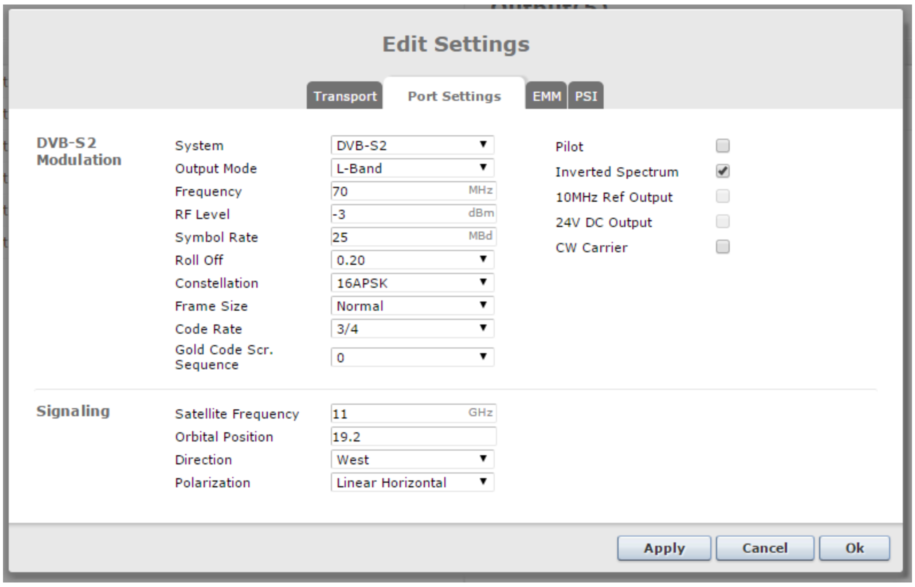
Frequency	47 → 862MHz
Constellation	Choose either: • QPSK • QAM16 • QAM64
RF Level	-10 → +2.2dBm
Bandwidth	5, 6, 7, or 8MHz
Inner Code	1/2, 2/3, 3/4, 5/6, or 7/8
Tx Mode	2K or 8K
Guard Interval	1/32, 1/16, 1/8, or ¼

CW Carrier	Enables Continuous wave signal, disable modulation and only output a single carrier at the configured frequency (for test only).
Inverted Spectrum	Enables Inverted Spectrum on Output signal.

Bitrate and **Symbol rate** cannot be modified as these two parameters are dependent on other modulation parameters; hence they are calculated accordingly. In addition, the RF level is subject to change in future releases – refer to the most recent data sheet for the correct value.

8.4.7 DVB-S/S2, DVB-S2X Output Modules

The DVB-S/S2 and DVB-S/S2/S2Xoutput modules are available in two with two different (SM-100) or combined (SM-300) output bands, IF and L-Band. Depending on the module there are different parameters available for configuration.



The following parameters are available.

Modulation:

System	The following option can be selected from system • DVB-S • DVB-S2
Output	IF or L-Band (SM-300 only)
Frequency	Specify the DVB-S/S2 frequency in MHz. For the IF output, valid range is 70 – 200Mhz. Default value is 70 MHz. For the L-Band output, the valid range is 950 – 2150 MHz.
Constellation	Specify the Constellation as below • DVB-S: QPSK only • DVB-S2: QPSK, 8PSK,16 APSK, 32 APSK

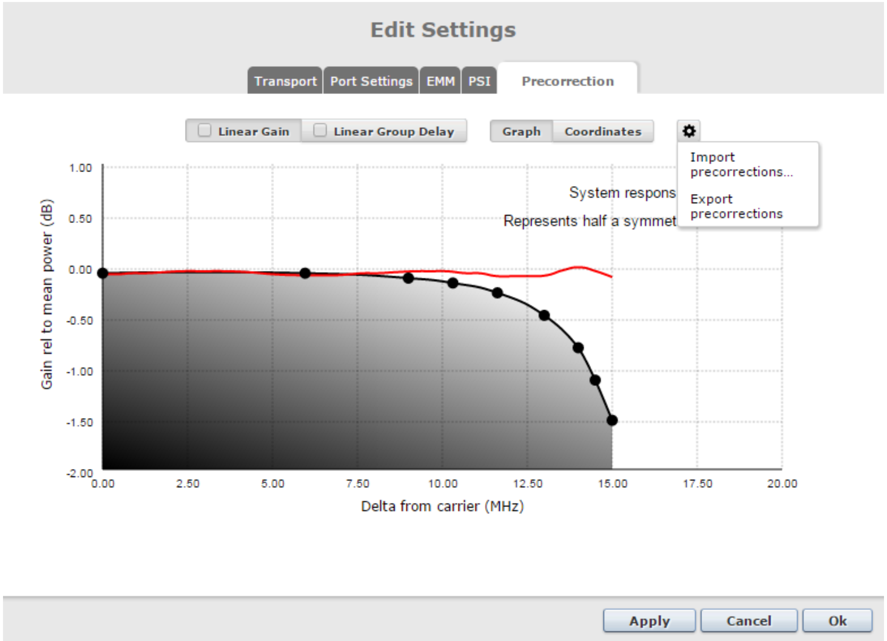
RF Level	Specify the RF Level in dBm, valid range is -15 – 0 dBm.
Symbol Rate	Specify the symbol rate in MBd, valid range is 1-45 MBd.
Code rate	Specify the Code rate from the list of pull-down options
Roll off	Specify the Roll off from the list of pull-down options
Gold Code Scr. Sequence	Define the Gold Code Scrambling Sequence number (SM-300 only)
Pilot	Enables the pilot carrier
CW Carrier	Enables Continuous wave signal. This will disable the modulation and only output a single carrier at the configured frequency
Inverted Spectrum	If enabled, the output spectrum is inverted
10MHz Ref Output	Enable embedded 10Mhz output on the output port (SM-300 only)
24V DC Output	Enable 24V DC output on the output port (SM-300 only)

Signaling:

Frequency	Downstream frequency to be signaled in the output NIT
Orbital Position	Ex.19.2
West/East	West or East
Polarization	Lin Horizontal/vertical Circular Left/ Right

8.4.7.1 Linear Pre-correction on DVB-S/S2 Output.

In order to compensate both linear distortions in the transmission chain, it is possible to adjust the modulator output to match these characteristics. This is done via the pre-correction configuration page. When using the linear pre-correction algorithm, both Gain and Group Delay correction is supported.



The graphical view for Gain and Group delay consist of two graphs, the filter characteristics of a transmission chain (provided by the user) and the system response utilizing the optimized precorrection filter computed on the MMI card.

	Please note that the optimization algorithm for group delay contains some random elements and might not give the desired result 100% of the time. Since the optimization runs only if new information is provided, to the user will have to change one value slightly before pressing **Apply** to re-optimize and obtain the desired result.

The graphical view may also be switched to a textual view where the points can be added and changed. This can be done by pressing the co-ordinates button. In this view, the graph window ranges may also be changed through "Min X, Max X" and "Min Y, Max Y". This values can be chosen freely within reasonable values (Gain: Min X ≥ 0, Max X ≤ 35, Min Y ≥ -5, Max Y ≤5 and for Group Delay: Min X ≥ 0, Max X ≤ 35, Min Y ≥ 0, Max Y ≤ 300). The restrictions for the points are as following:

Gain:

- Each X-value has to be unique.
- Y has to decrease with increasing X
- At least 5 points.
- Only two decimals places.

Group Delay:

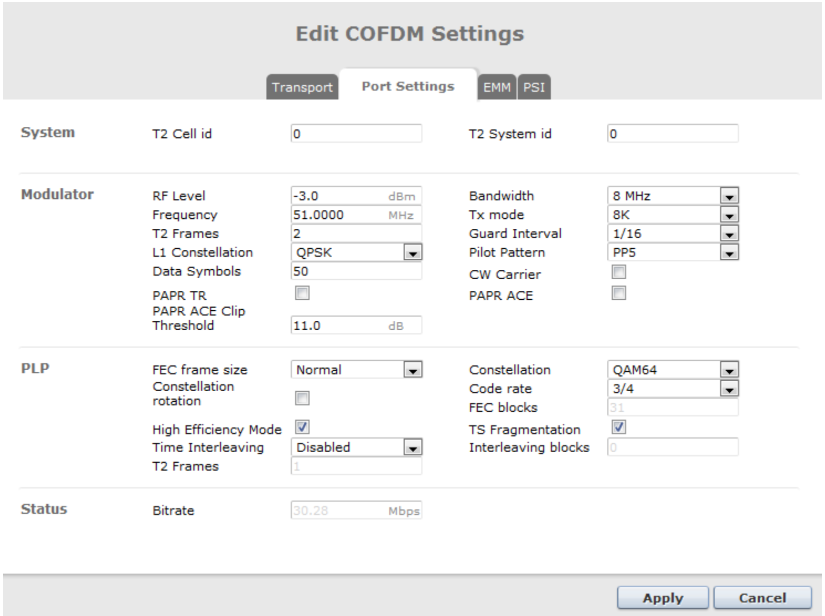
- Each X-value has to be unique.
- Y has to increase with increasing X
- At least 5 points.
- Only two decimals places.

Once configured, the Linear Gain or Linear Group Delay settings can be enabled by marking the checkbox in the tab and clicking 'Apply'.

It is possible to import/export the pre-correction data and this makes it simpler to move the pre-correction settings to other modulators that use the same settings. This can be accessed by the gear icon and seen in the screenshot above.

8.4.8 DVB-T2 Output Module

For DVB-T2 output modules, the **Port Settings** tab is shown below:



Modulator

RF Level	RF level measured in dBmV
Frequency	Currently tuned frequency in MHz
Bandwidth	Bandwidth of the currently tuned channel
CW Carrier	Enables continuous wave signal (For test only).

Status

Bitrate	Shows the current effective bitrate of the output port

The available configuration parameters in the GUI will not be documented in detail. The parameters are according to the DVB-T2 specification, ETSI EN 302 755 v. 1.2.1 (2010-10). The configuration of a DVB-T2 transmitter requires a good working knowledge of this specification as well as the DVB-T2 implementation guidelines, ETSI TS 102 831. Chapters 4 through 6 of the implementation guidelines is a good place to start with regard to a high level understanding of the parameters involved.

The user interface attempts to verify that the chosen combination of parameters is valid. Invalid entries will be highlighted in red and "Apply" will not work unless errors have been corrected.

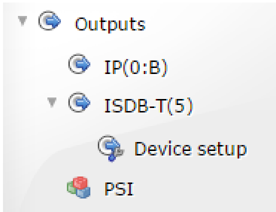
The "FEC blocks" and "Bitrate" are status parameters that indicate the expected payload carrying capacity of the chosen parameters.

More information regarding the configuration of the T2 output module can be found in the Terrestrial Solution Configuration Guide

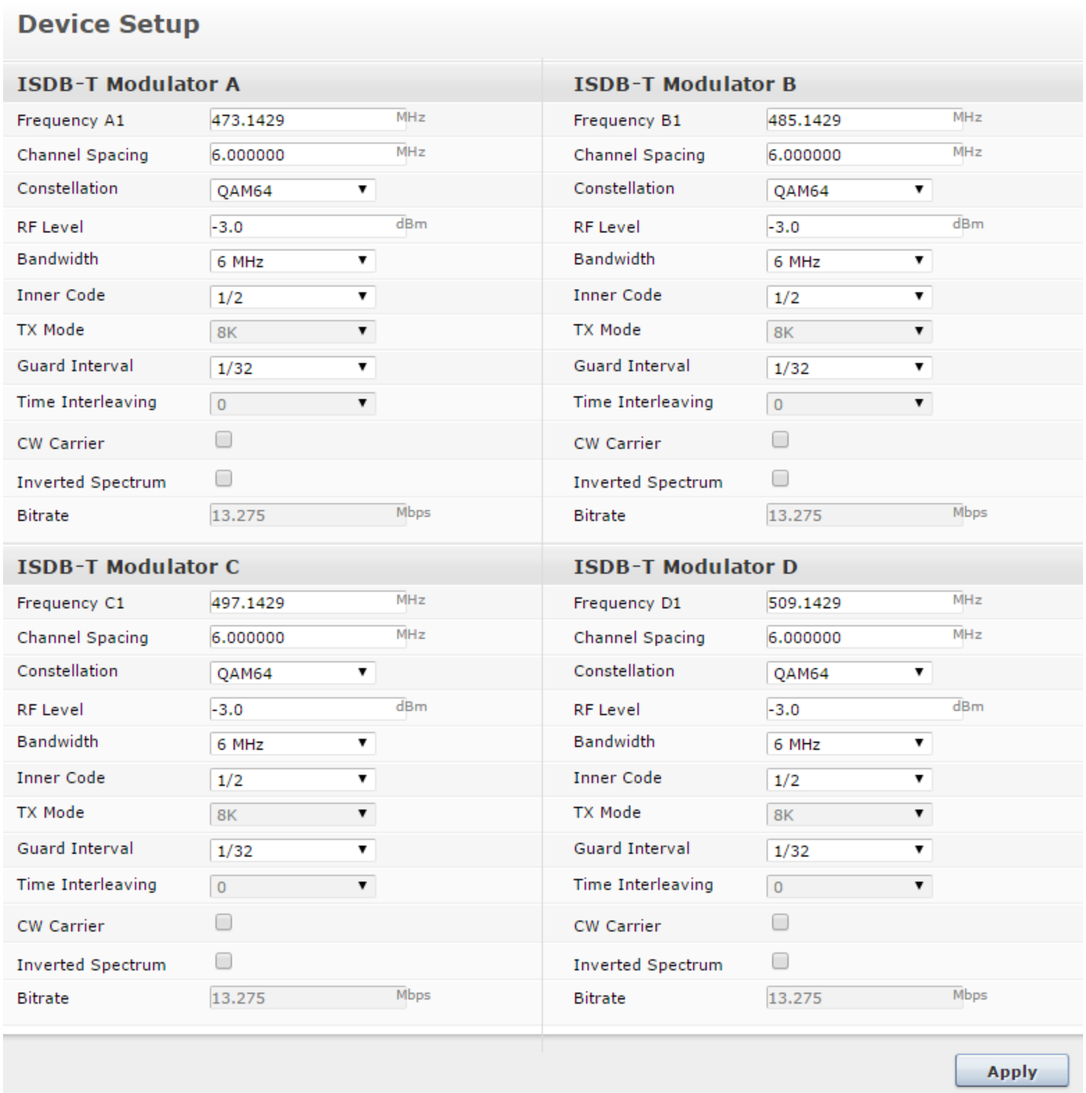
8.4.9 ISDB-T Output Module

The ISDB-T modules **Port Settings** tab is not modifiable as the parameter values are set under **Outputs → ISDB-T → Device setup.**

Although the ISDB-T output has two physical outputs, it carries up to eight transport streams. The RF connectors on the output are configured as such: the first two block modulators A and B, output on the port marked as **A+B**, the last two block modulators C and D output on the port marked as **C+D**.



When **Device Setup** is selected, both modulators can be configured from the resulting dialog:

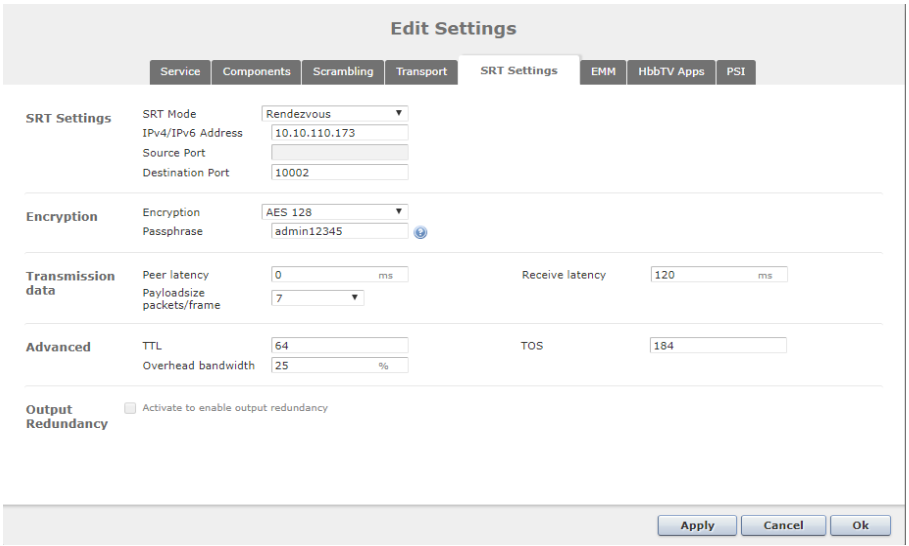


The following options are available for the port settings:

Frequency	47 → 862MHz
Constellation	Select from pull-down options • QPSK • QAM16 • QAM64
RF Level	-10 → +2.2dBm
Bandwidth	6, 7, or 8MHz
Inner Code	1/2, 2/3, 3/4, 5/6, or 7/8
Tx Mode	8K
Guard Interval	1/32, 1/16, 1/8, or ¼
CW Carrier	Enables Continuous wave signal, disable modulation and only output a single carrier at the configured frequency (for test only).
Inverted Spectrum	Enables Inverted Spectrum on Output signal.

8.4.10 SRT IP Output Module

For SRT output module, the SRT settings tab is shown below:



SRT Settings:

SRT Mode	Select SRT mode: Caller, Listener or Rendezvous
IP Address	Specify the IP address
Source Port	This will be the port from which SRT will send video data
Destination Port	Select port which SRT should try to connect to

Encryption:

Encryption	Select encryption options: AES128, AES192, AES 256
Passphrase	The password. Minimum length is 10 characters

Transmission Data:

Peer latency	Set the minimum latency for the peer
Receive latency	Set the latency buffer. Gives time to the SRT to do retransmission on lost packets.
Payload size packets/frame	Number of MPEG TS packets in each transmission

Advanced:

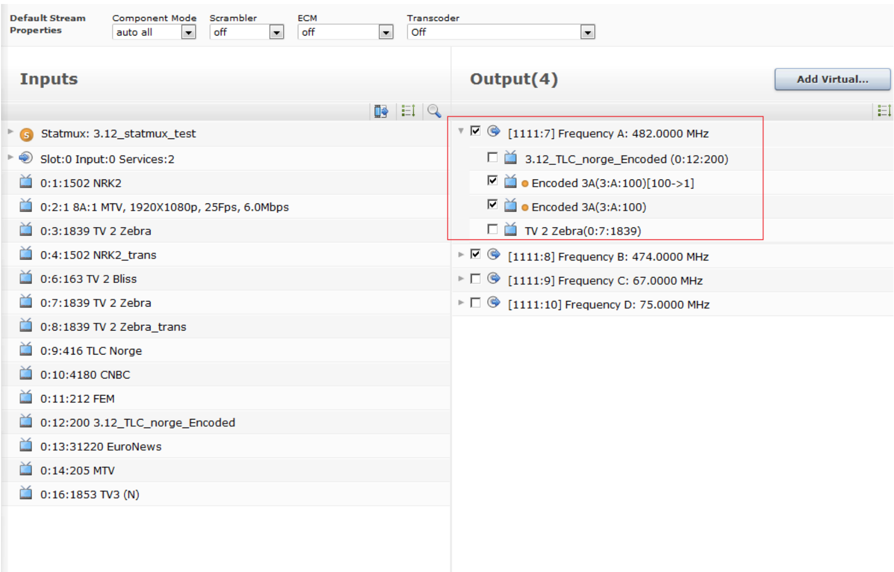
TTL	Time to live for IP packet
TOS	Type of IP service
Overhead bandwidth	Specify how much bandwidth above the estimate bandwidth the SRT can use when recovering lost packets

8.5 Output Options

8.5.1 Enable/Disable Services in Outgoing MPTS.

It is possible to enable and disable a service in an MPTS output in addition to enable/disable the complete MPTS.

In order to do this, use the tick box on the output of each service in a MPTS once expanded.

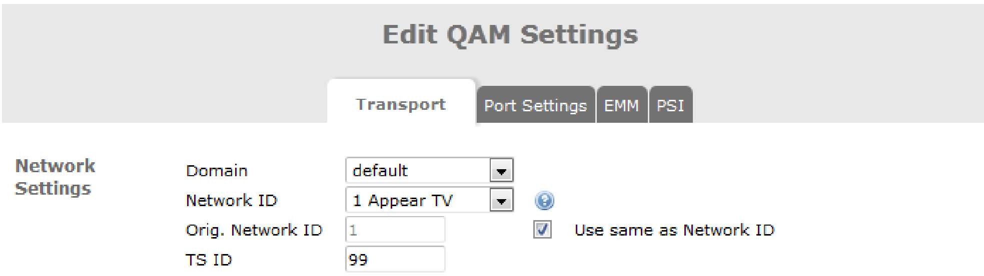


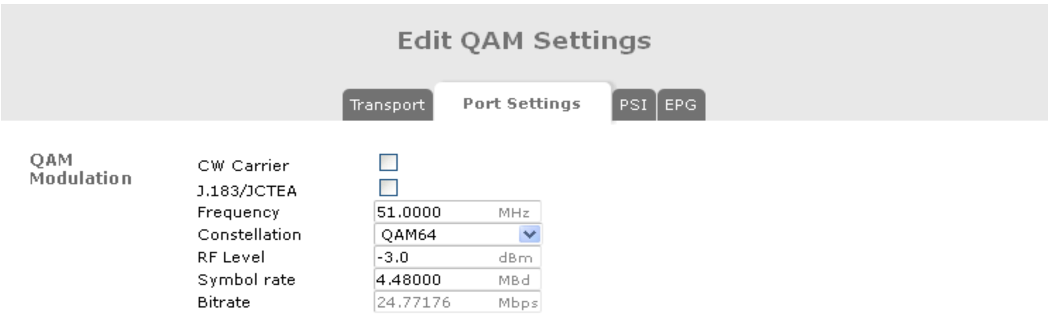
8.5.2 Virtual MPTS Output

This feature provides the capability to generate the NIT including Delivery System Descriptor for MPTS outputs currently not configured by the unit. The Delivery System Descriptor is defined as part of the MPTS setup; data inserted will be included in the NIT.

For the ASI, COFDM, or QAM output, the virtual output provides this feature. It may be added from the **Outputs** page using the **Add Virtual** button enabling the signaling of other transports not present in the same unit.

Clicking the **Add Virtual** button displays a dialog similar to the one shown below, allowing you to insert the **Network ID**, **TS ID** in the **Transport** tab, followed by the QAM configuration (for this example) in the **Port Settings** tab.

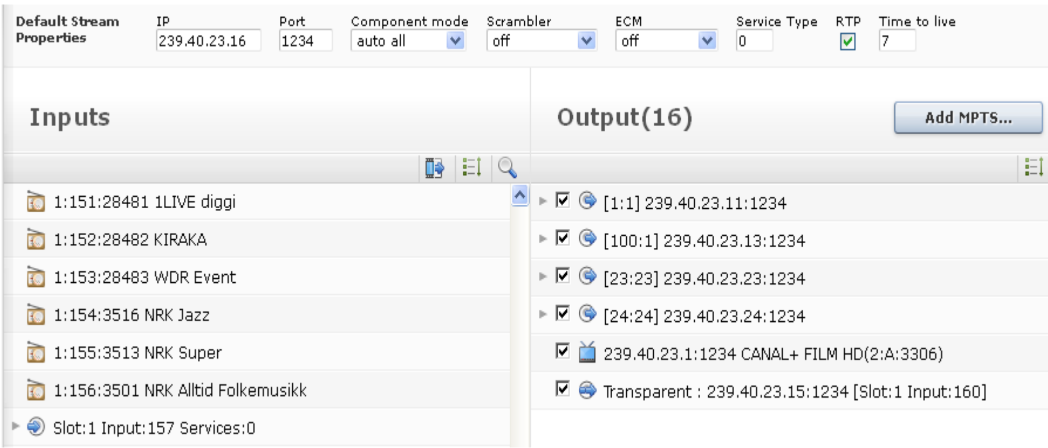




8.5.3 MPTS Transparent Mode

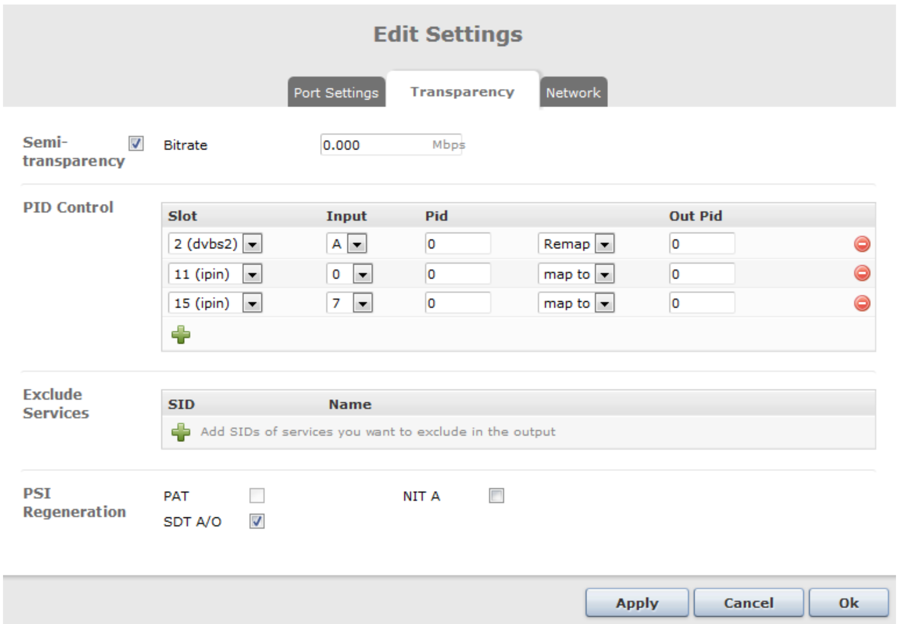
With MPTS Transparent Mode, an input stream is forwarded to the output without any processing, i.e. output equals input, including null packets (for modulated outputs, null packets will be removed and re-added to exactly fit the configured modulation bit rate).

When setting up a transparent stream, the **Add MPTS** button is **not** used. As with an SPTS, simply drag an MPTS from the list of available MPTS's over to the output pane. In the output pane, the name of a stream will indicate whether it is transparent or not (as shown in the figure below).



8.5.4 MPTS Semi-Transparent Mode

The semi-transparent mode is a subset of the transparent mode. The semi-transparent mode allows the user to replace some selected components. Currently this feature allows for replacement of the *NIT table only*.To configure semi-transparent mode, create a transparent output, and then double click on it to access the **Stream Properties** dialog**.** Then, go on to the **Transparency** tab to configure the new NIT Source (**Generate NIT A**). In this mode, for IP and ASI output modules, null packets are always removed and re-added.



The following parameters are available if enabled:

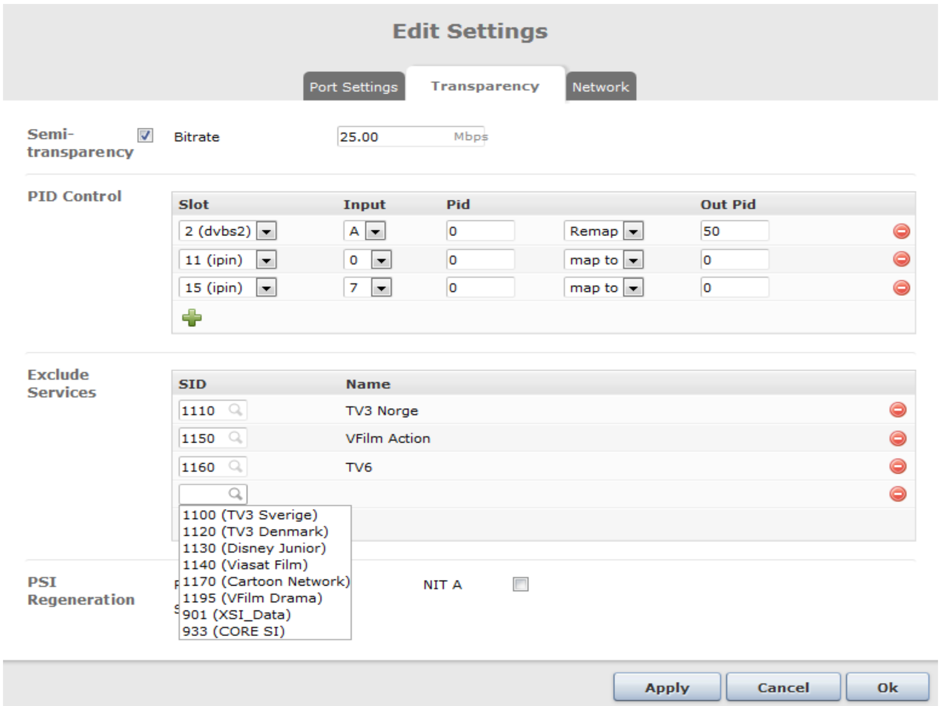
Bitrate	Bitrate in Mbps. This parameter is mandatory in Semi-transparent mode for IP output.
PID Control	When Semi-transparency is enabled, it is possible to both: - Stop PIDs from the transparent input source - Re-map PIDs from the transparent input source to a different PID ID

	- Import PIDs from another input source to the transparent output. It is possible to add multiple rules by clicking on the icon
Exclude Services	See below
PSI Regeneration	Depending on the Semi-transparent options chosen, it may be required to regenerate the following PSI tables: - PAT - SDT-Actual/Other - NIT-Actual This option is available to be enabled/disabled per table.

8.5.5 Service Filtering in Semi-Transparent Mode

Service filtering in Semi- Transparent mode enables user to enter SID of the services to be stopped. It is possible to click magnifying icon and select from list of services found on the input. When a service is added to the filter list, the following will occur:

- All PIDs that are part of a filtered service will be stopped.
- PIDs shared with non filtered services are not stopped.
- PIDs explicitly mapped through/remapped by user (in the PID Import/Remap section), that belongs to a filtered service, will not be stopped.
- If PAT re-generation is enabled, PMT PIDs of the filtered services is stopped.

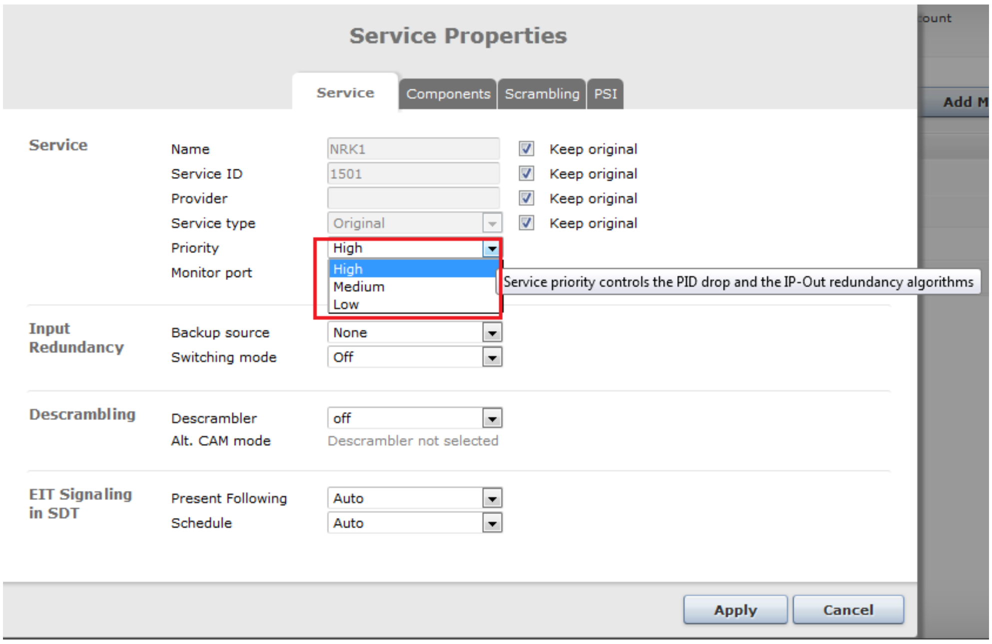


8.5.6 Service Priority Selection

For each service on the output it is possible to set the service priority and this determines from which services packets are dropped if the total rate exceeds the constant bit rate of the output MPTS.

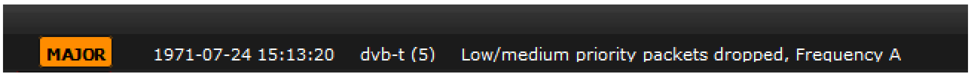
This is configured from the Service tab under Service Properties for each program under an output MPTS.

Service priority is supported on all output cards. The default value for all services is high priority.



If low or medium priority packets are discarded due to exceeding the band with limitations, the major alarm "Low/medium priority packets dropped" is set.

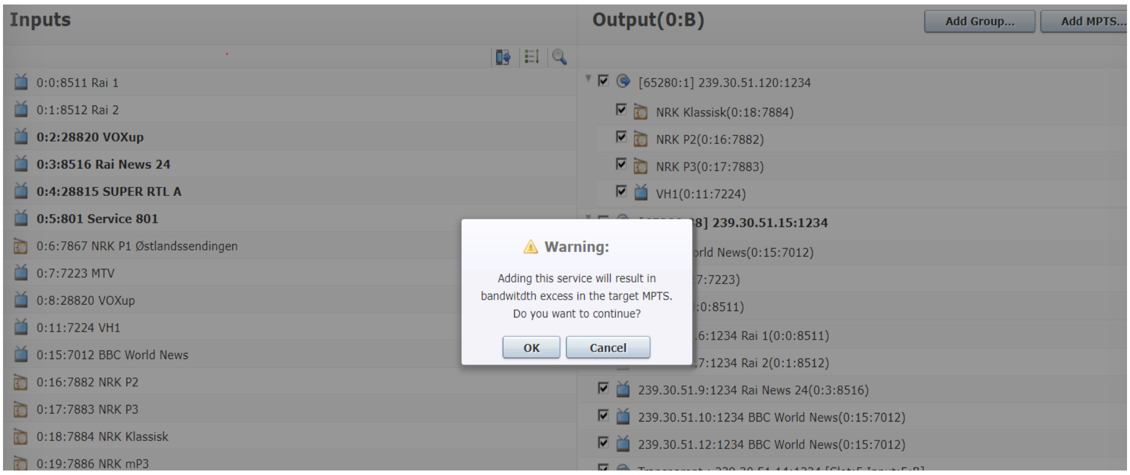
If the link is so overloaded that discarding all low/medium priority packets is not enough, the behaviour is to empty the output buffer.. If this happens, the critical alarm "Output buffer overflow" is set. This alarm will mask the "Low/medium priority packets dropped" alarm.



Any packets dropped due to service priority will be counted, and the total number is displayed per MPTS on the Output View.

8.5.7 Popup warning if new service exceeds available MPTS bitrate

When user is configuring a new service into an IP and ASI output MPTS (drag&drop), under the assumption of always being a CBR service, user should compare the bitrate of that input service with the bandwidth left in the output MUX/MPTS and if adding the new service would exceed the total bandwidth and cause packet dropping, the user should get a pop-up to confirm the action or cancel.



8.6 PSI/PSIP Configuration

The unit offers PSI/SI as well as initial PSIP regeneration support – with a table profile mode of either DVB or ATSC. This setting determines which tables are available for regeneration and subsequently, which tables will be listed in the GUI dialogs.

Below is an outline of the supported tables together with which profile(s) they are available in. DVB or ATSC tables that are not listed below are currently not supported.

Table	Available in Profile(s)	Default Playout Interval (ms)	Supported function
PAT	DVB ATSC	200	Generated by the unit
CAT	DVB	500	When CAT is in play mode then the CAT is generated by the unit. When the EMM is mapped from the input, using the include EMM on the Transport node, then the CAT Mode should be set to stop as the CAT and EMM is copied from the input.
PMT	DVB ATSC	200	Regenerated from input. Service ID and component PIDs and PMT PID may be remapped. Table is automatically updated to reflect any PID filtering/remapping done in the GUI.
BAT	DVB	1000	Generated by User Input from GUI.
NIT-A	DVB	2000	NIT is generated based on the values entered by user. All transports defined in the same network will be included in NIT. NIT Other is not supported IF NIT is not enabled then PID 16 (0x0010) will not be transmitted. The NIT supports the following descriptors:

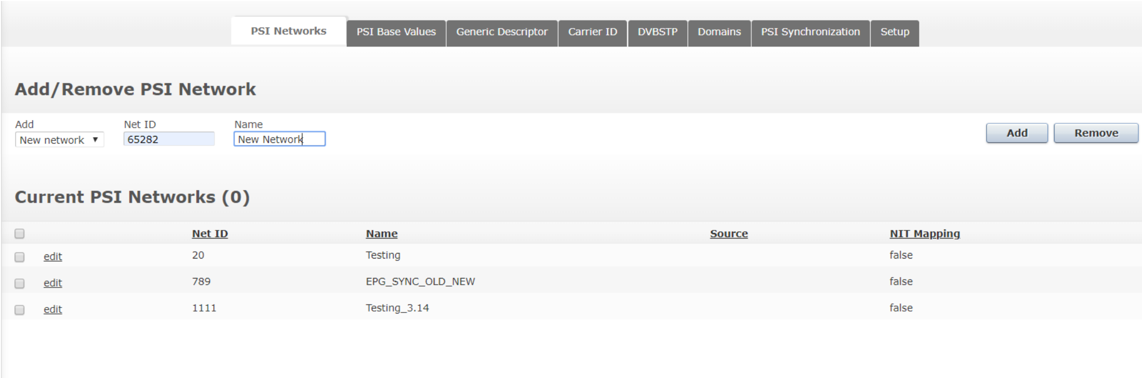
			• Delivery descriptors • Logical Channel Descriptors
SDT-A	DVB	1000	Regenerated from input, if available, otherwise generated. The Service ID, name, provider and type can be modified.
SDT-O	DVB	5000	Content is identical to corresponding SDT-A.
EIT P/F-A	DVB	1000	Regenerated from input
EIT P/F-O	DVB	5000	Regenerated from input. Supported in MPTS mode only.
TDT	DVB	15000	Generated based on system time
TOT	DVB	15000	Generated based on system time A single TOT with a single Local Time Offset Descriptor can be defined globally per unit. The playout mode of the globally defined TOT is still configurable per Transport Stream.
MGT	ATSC	100	PSIP Master Guide Table. Generated based on currently active PSIP tables.
TVCT	ATSC	200	Terrestrial Virtual Channel Table, Regenerated based on input, if available, otherwise generated. Short Channel Name and program_number can be modified (use DVB Service Name and Service ID editing - see section 8.3.7 for details). Input Service Location Descriptor is regenerated based on desired PID mapping, but not generated if there is no input.
CVCT	ATSC	200	Same as TVCT. Cable specific parameters are copied from input or assigned default values (path_select = path1 and OOB = false)

The PSI is designed to offer a global default configuration as well as configurations of individual tables for each transport stream. The global configuration can be used as a default, but if needed, the individual tables on each MPTS/SPTS output can be configured independently.

i	PAT and PMT tables should always be included on an outgoing transport stream. Event Information related tables like EIT P/F-A and EIT schedule are configured in the EPG section **0** (requires EPG module for EIT schedule).

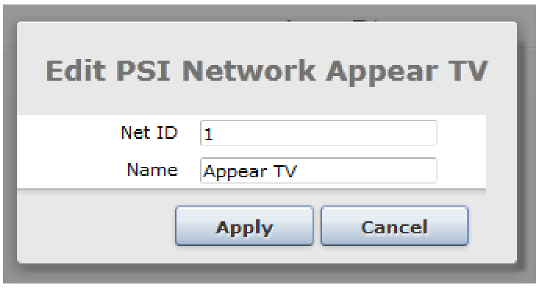
8.6.1 Editing the PSI Network configuration

To access this information, select **Outputs→PSI** and select the PSI Networks tab. PSI Networks can be added and removed via this dialog shown in the figure below. To add a new PSI Network, select "New network" in the "Add" drop-down menu, fill in the Net ID (Name field is optional) and click Add:



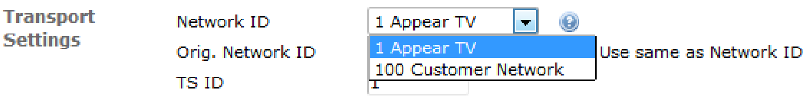
This feature allows the operator to edit the network name that is signalled in the PSI via the network_name_descriptor in the DVB Network Information Table (NIT). The name is configurable per DVB network and is typically used by IRDs when displaying tuning results.

To edit the network name, go to the PSI Networks tab of the PSI settings (accessed via **Outputs->PSI** node in the navigation bar). There is an entry for every PSI network defined in the system which can be clicked to access an edit dialog:



In order to remove a PSI Network, select the desired network checkbox and click **Remove**.

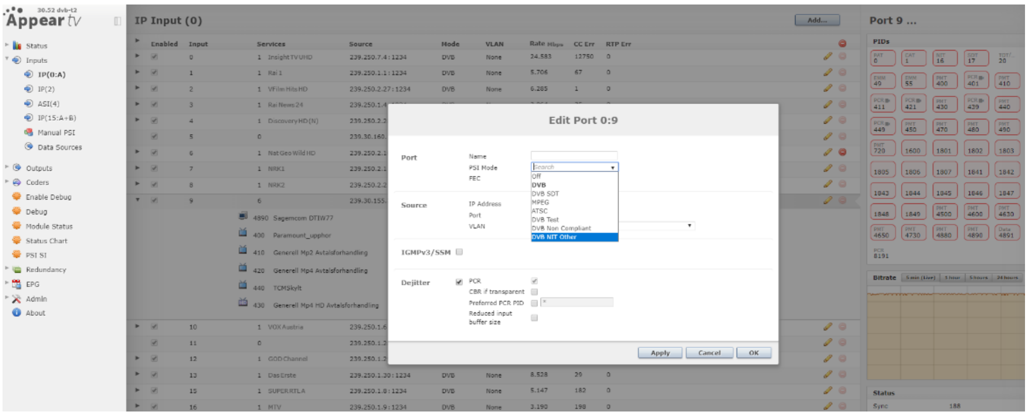
When associating transport streams with PSI networks, the operator is offered a drop down box with the available selections:



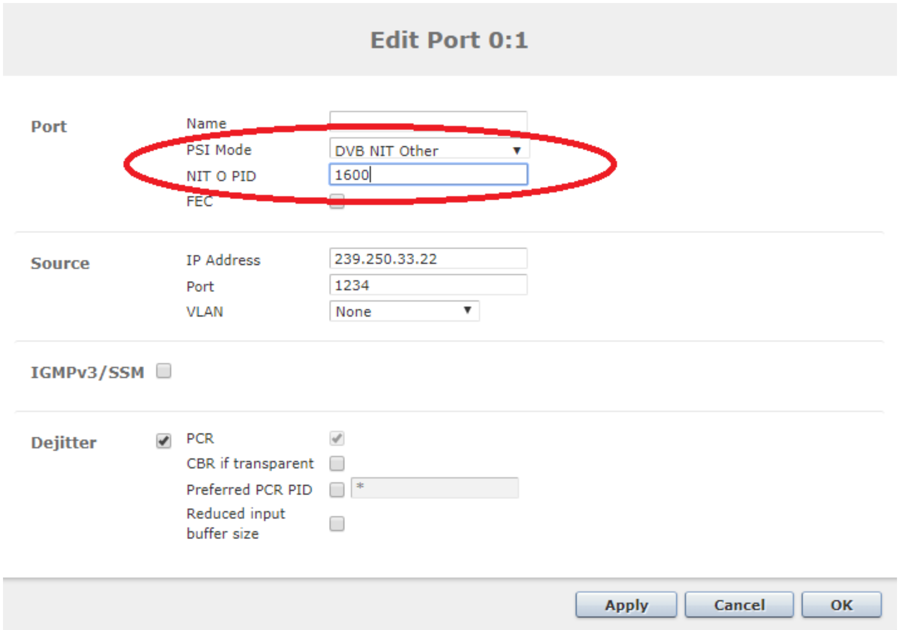
If no PSI networks are defined, it is still possible to easily create SPTS outputs via a simple drag and drop – the system will automatically associate these with a PSI network within the default PSI domain. The system will also automatically create a default network within a newly defined domain with network ID 1337.

8.6.2 NIT Mapping in PSI Network configuration

This feature allows the user to map a NIT Actual table from an input that contains a NIT Other table, instead of generating a NIT Actual table from scratch in the output. In order to perform NIT Mapping, user have to select the "DVB NIT Other" in the "PSI Mode" drop-down menu, when editing an existing source by clicking on the edit icon (typically a pencil) to launch port edit window.

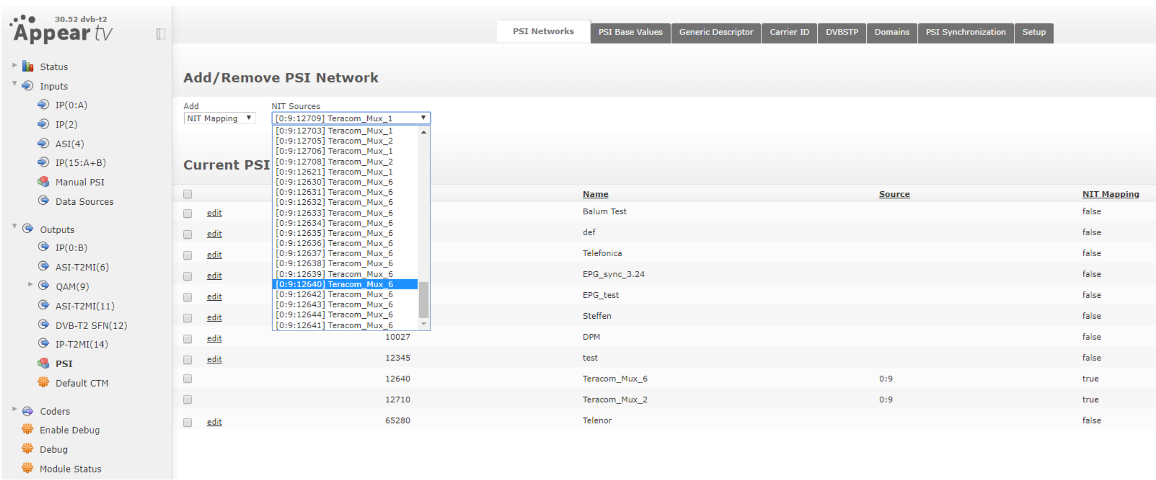


When "NIT Other" is selected, it is required to provide the "NIT O PID". Please see the image below:

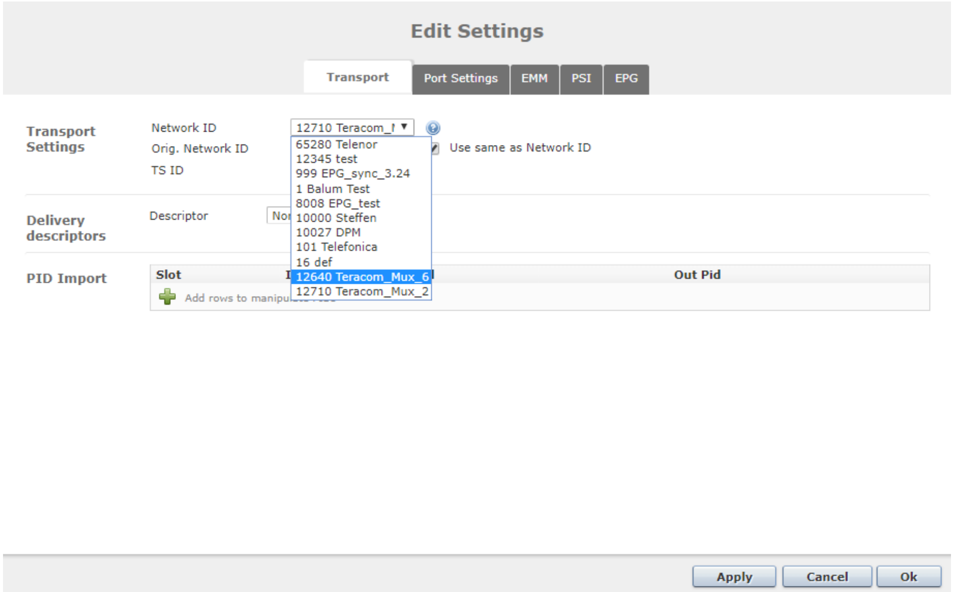


Now, user can choose a network ID extracted from the NIT Other of that input source.

In order to perform this, user have to navigate to **Outputs->PSI**, select "NIT Mapping" in the Add drop-down menu, and choose one from the "NIT source" drop-down:

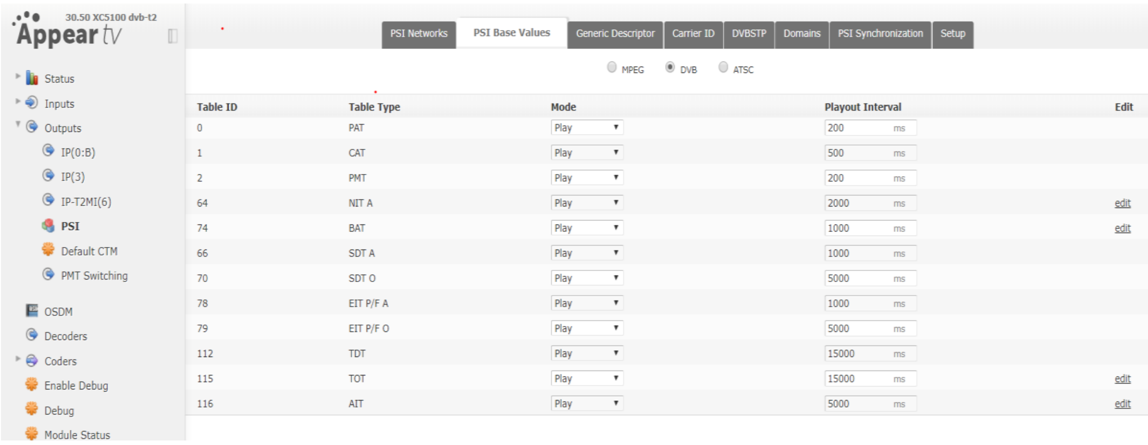


Once the desired Network is selected, the user can create a new output MPTS/MUX. In the "Transport" tab, user have to choose the Network ID that has been mapped previously, as shown below:



8.6.3 Editing the PSI Default Values

The PSI Default Values tab displays the default playout mode and interval for each PSI/SI table



The following fields are available:

Table Id	For reference only, not configurable
Table Type	For reference only
Mode	Select one of the three or four available modes, depending on the table: **Stop** – playout is disabled **Pass** – the table PID will be forwarded from the input, without any modification. This means that tables sharing a common PID (e.g. SDT A and SDT O, EIT PF A and EIT PF O, as well as TDT and TOT) must have common Pass settings to avoid a PID clash with regenerated tables from the playout carousel. In addition, Pass is not supported for PMT, MGT, TVCT, and CVCT.

	Play – the table will be enabled for playout
Playout Interval	Interval in ms between transmissions of each section of the table by the playout carousel.
Edit	Detail configuration of the values: The **BAT Settings** dialog provide access to the ability to define bouquets The **NIT Settings** dialog provides access to the Logical Channel Descriptor's edit dialog The **TOT Settings** dialog provides access to the TOT Local Time Offset Descriptor's edit dialog

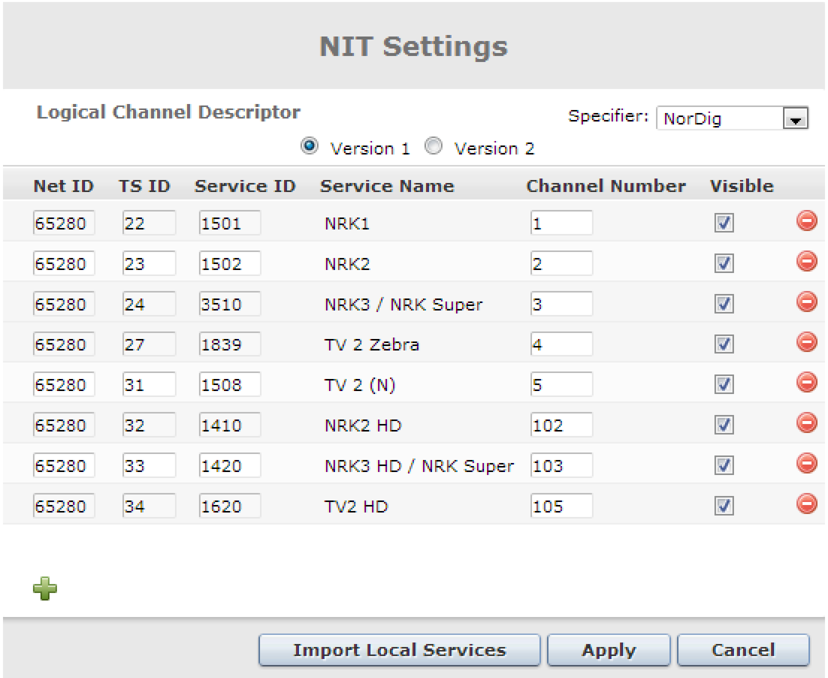
The following fields are available in NTSC tab:

MPEG DVB ATSC

Table ID	Table Type	Mode	Playout Interval	Edit
0	PAT	Play	200 ms	
1	CAT	Play	500 ms	
2	PMT	Play	200 ms	
199	MGT	Play	100 ms	
200	TVCT	Stop	200 ms	
201	CVCT	Play	200 ms	
203	EIT	Play	500 ms	
204	ETT	Play	60000 ms	
205	STT	Play	500 ms	edit

8.6.4 Editing the Logical Chanel Descriptor (NIT)

The Logic Channel Descriptor in NIT is used to signal to the receiver which service should be assigned to which channel number. To add a channel assignment in the outgoing NIT, click on the **edit** NIT option.



Specifier	Four possible options are available: • NorDig – the Nordic region descriptor (version 1 and 2) • DigitalEurope (with HD Simulcast support) • Ofcom • LCD – UK specific LCN descriptor
Net ID	Output Network ID
TS ID	Output Transport Stream ID
Service ID	Output Service ID
Service Name	Service Name, obtained from the stream itself. This parameter is empty if the service is added manually by clicking on the button.
Channel Number	This number is the actual number assigned to a channel for the viewer.
Visible	Each logical channel has a checkbox associated with it, which represents the visibility state of the channel. The default value of this flag is visible.

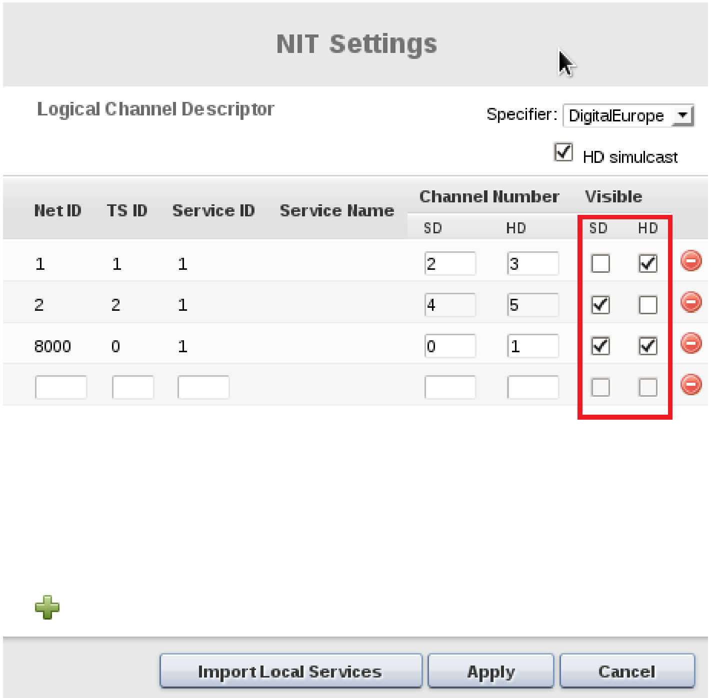
Select the specifier to be used from the selection box. To add channel already configured on the output, select **Import Local Services**. Then all the services currently configured on output will be listed and it is possible to edit the channel numbers directly. For services not handled by this unit or pre-configure a service that will be added later, click on and manually insert all data required for each service.

To modify an existing setup, simply change the channel number or click to remove an existing channel number entry.

If the service re-multiplexing layout changes, this configuration needs to be updated manually (e.g. if a service is added or removed).

When selecting Digital Europe, this will enable support for HD Simulcast descriptor by clicking on Check box before HD Simulcast seen in figure below.

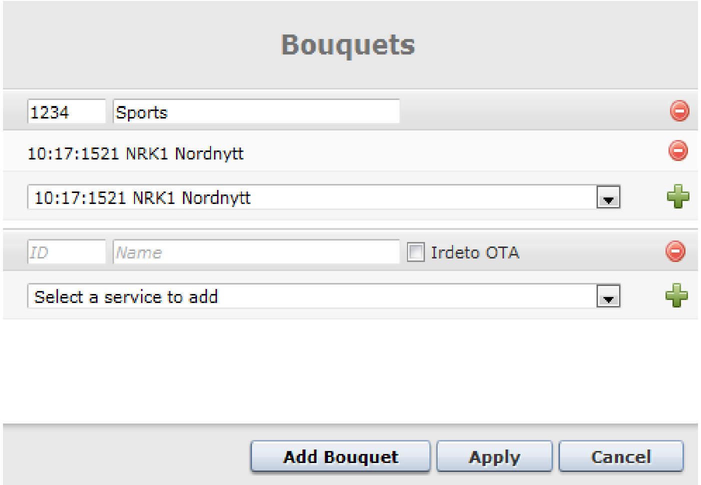
It is possible to add all configured output services to this list be clicking on the Import Local Service and it will import all data as shown in below.



8.6.5 Editing the BAT table

When a bouquet has been defined it is possible to add services to the bouquet. It is then possible to add the services with the software package for the respective STB's.

Irdeto has defined a special bouquet which is used for STB software download. To add this use the Irdeto OTA check box. It is only possible to add one Irdeto OTA bouquet.



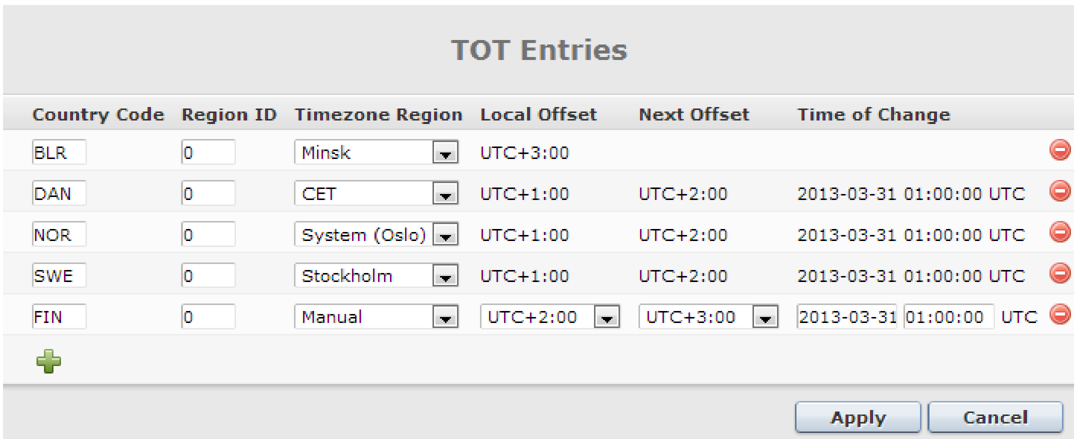
ID	Bouquet ID
Name	Name of the bouquet
Service to add	Service can be selected from the drop down available list of service from Input port. This parameter is empty if the service is added manually by clicking on the ✚ button.
Irdeto OTA	Irdeto defined special bouquet which is used for STB software download.

8.6.6 Editing the TOT Local Time Offset Descriptor

It is possible to use Time Zones for automatic generation and updating of the **Local Time Offset descriptor.**

Once the correct Time Zone information has been loaded to the unit, the PSI Base Value tab will present these and the user can edit the Time Offset Table (TOT) and generate information for several Countries/Regions.

If you required the Time Zone file for a given region, please contact support@appeartv.com . This file can be installed from the Maintenance Center, by selecting and uploading to the MMI slot.



The following fields are displayed for TOT Entries settings:

Country Code	DVB country code. See the Alpha-3 code listed at http://en.wikipedia.org/wiki/ISO_3166-1 for more information.
Region ID	DVB region. See ETSI EN 300 468 for more information.
Timezone Region	If installed, set the correct timezone region. It is also possible to select Manual and specify these values.
Local Time Offset	Current offset (from GMT/UTC)
Next Time Offset	Next offset (from GMT/UTC), e.g. Summer Time can be expressed as +1 hour.
Time of Change	Time (GMT/UTC) when the transition takes place and the Next Time Offset becomes valid.

The TOT settings offer the possibility to configure any future changes in time, such as Summer Time and leap years, in two sections – Local Time Offset Change and Time of Change. For more information, refer to ETSI EN 300 468 v1.7.1 (2006-05) **Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems**.

i	It is also possible to enter Manual changes, but these entries will not be automatically updated. This information is used to generate the TOT and automatically update the table on the next time of change.

8.6.7 PSI Synchronization

PSI Synchronization allows the operator to synchronize NIT and/or SDT tables between units that are part of the same DVB network(s) – enabling generation of a complete NIT and/or SDT table. If two or more units perform PSI synchronization with each other, they will both signal all transport streams in shared DVB networks.

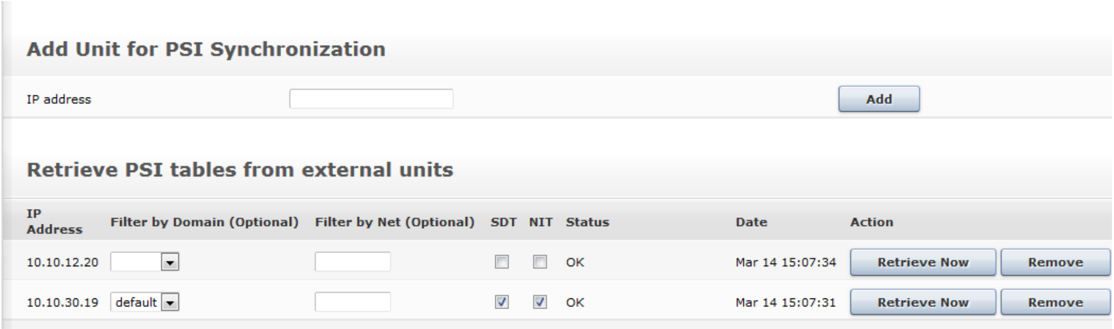
Important points to note when using this functionality:

The management interface on the MMI card is used to establish TCP/IP connections between units to be synchronized; hence the required network connectivity is a prerequisite.

All synchronization is initiated manually by the operator. Changes do not take effect until either Retrieve Now or Remove (explained below) is clicked. This also means that if PSI is updated on an external unit (e.g. a new transport stream is added/removed, remap SDT parameters, etc.) the operator must manually perform another synchronization to retrieve these updates.

The version number of NIT may be different between units, but the table content is the same. This may cause a small delay for a STB when zapping between transport streams provided by different units as it would appear to the STB that a NIT update has occurred.

The PSI Synchronization functionality is accessible from the PSI dialog by clicking on the respective tab:



To add a unit for PSI synchronization, enter in the MMI IP address of the external unit (in dotted quad format) and click **Add**.

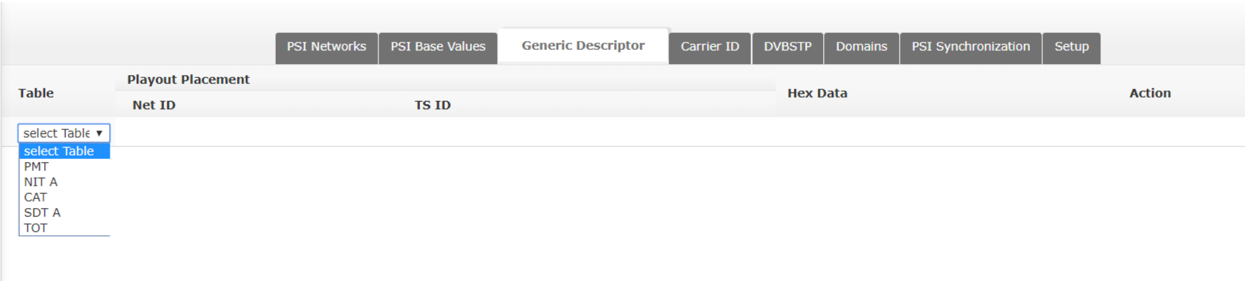
Now a table entry will be visible in the **Retrieve PSI tables from external units** section of the dialog, identifiable by the IP address.

The following parameters are displayed:

IP Address	IP address of the external unit MMI management interface
Filter by Domain (Optional)	Optionally select the PSI to syncronise from a specific domain from the remote unit
Filter by Net (Optional)	DVB network ID – if specified, only download external sections from this network. Otherwise, all sections are downloaded regardless of the network.
SDT	Check this box to synchronize SDT
NIT	Check this box to synchronize NIT
Status	Provides feedback on result of last synchronization attempt; if no attempt has been made, **Not Synced** is displayed.
Date	Time and date of last synchronization attempt; if no attempt has been made, this field is empty.
Action	**Retrieve Now** initiates a download of selected sections from the external unit. If the operation succeeds, the **Status** displays **OK** and the output PSI will automatically be regenerated using the received external sections. **Remove** removes the table entry and the output PSI is automatically regenerated so that all traces of external transport streams from the external unit are removed.

8.6.8 Inserting Generic Descriptors

The Generic Descriptor insertion functionality (accessible from the PSI dialog by clicking on the respective tab) allows insertion of arbitrary PSI descriptors into selected DVB output table descriptor loops. This feature is useful when an important descriptor is private or currently unsupported.



Each entry displayed in the table corresponds to a single generic descriptor placement.

Clicking on allows new descriptor entries to be inserted, initiating a sequence of context dependent configuration options via drop down boxes described in the following tables:

Table	Selected desired output table
Playout Placement	A series of table dependent drop down boxes to select the desired descriptor loop locations: **Net ID/TS ID** – DVB Network and Transport Stream ID of desired output TS **Service ID** – DVB service ID of desired output service **Component** – input PID of an elementary_stream (not remapped value) All drop down boxes provide a list of currently available options together with the option to manually define an explicit value. After manually defining a value, click **Next** to continue the configuration process. Individual table placement instructions are provided in the **Generic Descriptor Loop Placement Instructions** below.
Hex Data	The descriptor in HEX format without a leading "ox". This should contain the correct 2 byte tag and 2 byte length. Descriptors with invalid descriptor_length will be rejected.
Action	Depending on the current configuration step, one of the following buttons will be displayed: Next – displayed when defining a new descriptor; click to validate the descriptor. Retry – displayed when a new descriptor fails descriptor_length validation; correct the error and click to retry validation. Add – displayed when a new descriptor passes descriptor_length validation; click to add the descriptor to output PSI. – Click to remove a previously defined descriptor

Generic Descriptor Loop Placement Instructions

Table	Loop Name	Loop Description	Placement Instructions
CAT	-	Only one loop	Specify explicit **Net ID** and **TS ID**
PMT	program_info	Descriptors for all elementary_streams	Specify explicit **Net ID**, **TS ID**, and **Service ID** Select "None" from **Component**
	ES_info	Descriptors for current elementary_stream block	Specify explicit **Net ID**, **TS ID**, and **Service ID** Specify the PID of the elementary stream from **Component**
NIT	network	Descriptors for entire network	Specify an explicit **Net ID** and **TS ID** Select "All" from the **TS ID** drop down box
	transport	Descriptors for current transport_stream block	Specify explicit **Net ID** and **TS ID**
SDT	service	Descriptors for current service block	Specify explicit **NET ID** and **TS ID**
TOT	-	Only one loop	No placement option since TOT is globally defined for the unit

Generic descriptor play out placement is static and the operator must maintain play out placement in terms of Net, TS and/or Service ID as well as input PID updates.

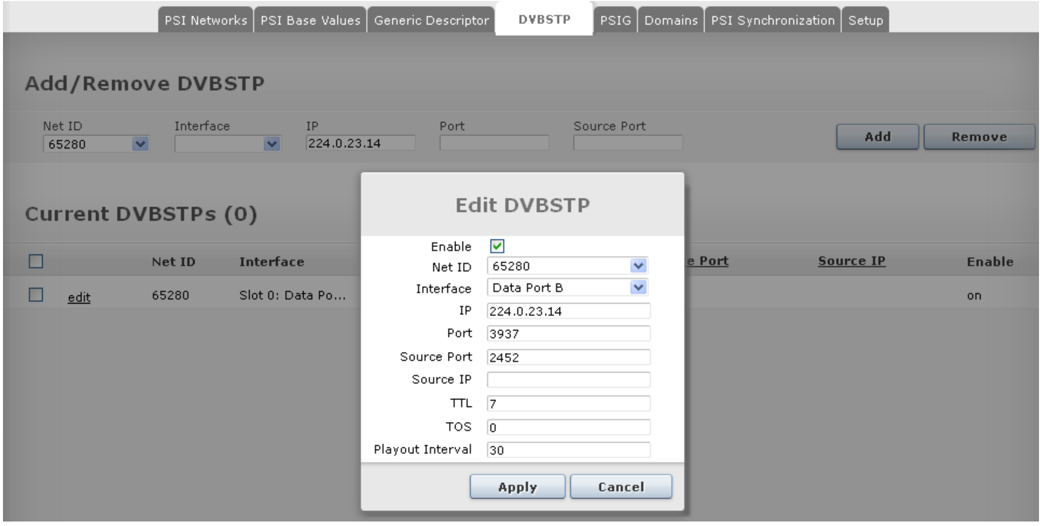
Insertion of a generic descriptor will not overwrite any existing descriptors that are configured on the output.

8.6.9 Inserting DVP STP

If required, the DVBSTP tab allows selection of which network to generate the DVB STP xml description file.

A ne DVB STP multicast can be added by entering the initial values and clicking on the **Add** button. Once added, this will be automatically enabled on the selected IP output.

If it is required to change this multicast, you can click the **edit** link in which the following selection is displayed:



Enable	Enables DVBSTP
Net ID	Specify a Net ID
Interface	Specify an Interface (Port)
IP	Specify an IP address.
Port	Specify a Port.
Source Port	Specify a source port
TTL	Set the Time-to-Live (TTL/IPv4)
TOS	Specifies the Type-of-Service (TOS)
Payout Interval	Interval in ms between transmissions of each section of the table by the play out carousel.

8.6.10 PSI Generation Setup

The Setup tab allows for modification of PSI generation settings like table versioning scheme, CA descriptor placement, PMT caching, and so on.

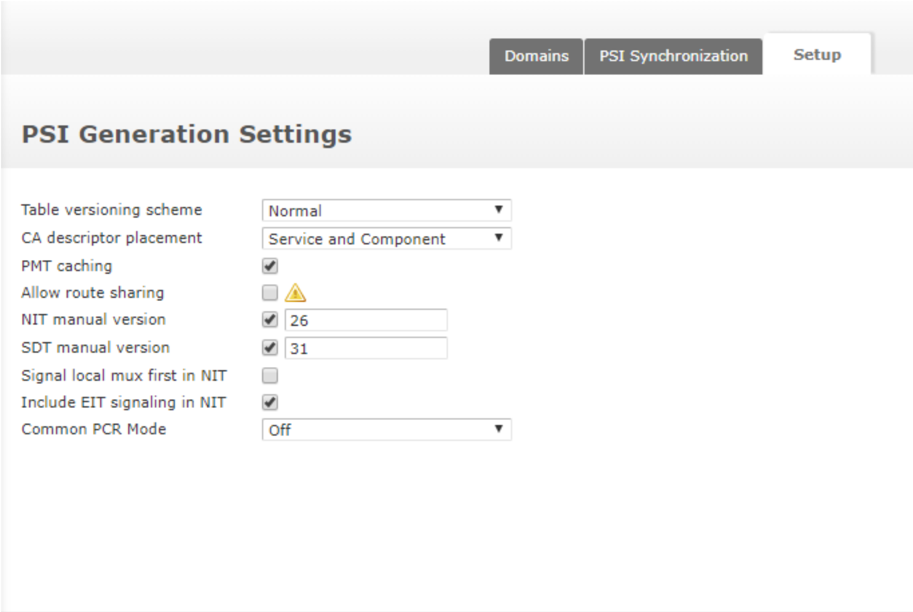


Table versioning scheme	Normally the version numbers of the PSI/SI tables are incremented by one for each change. This parameter provides the means to force outgoing tables to use Odd or Even numbers. This configuration is used in conjunction with *Output Redundancy* to differentiate two sources (Main and Backup) from each other, ensuring that receivers will detect if a redundancy switch has occurred. Should a switch occur, the receivers will reprocess the PMT and detect a potentially new PID line-up. The drop down box provides three options: **Normal** – version numbers are incremented normally **Force Odd** – version numbers are incremented using odd numbers only **Force Even** – version numbers are incremented using even numbers only
CA descriptor placement	Some STBs have specific requirements on the location of the CA descriptor in the PMT. By default, the unit will place the CA descriptor in both **Service** and **Component** level in the PMT. The drop down box provides three options: **Service Level** – CA descriptor is in the service loop only **Component Level** – CA descriptor is in the component loop only **Service and Component Level** – CA descriptor is in both loops
PMT caching	Checking this option ensures that the output will not lose the PMT even if the stream's input disappears.
Allow Route sharing	Enable option for Allow route sharing feature
NIT manual version	Forces the NIT version number to the given value
SDT manual version	Forces the SDT version number to the given value
Signal Local mux first	Enables to Sort the Local Mux first in NIT

in NIT	
Include EIT signaling in NIT	Enables the EIT linkage descriptor (0x04) to be excluded or included in the NIT generation. If EIT schedule information is present, by default, the system adds a linkage descriptor in the NIT. If EIT is present in multiple transports, then according to the DVB standard, the NIT will contain multiple linkage descriptors. When all transport streams contain the EIT schedule, some STBs jump to a different transport when using the EPG, causing the current program not to be displayed concurrently with the EPG. To prevent this behavior, we recommend that the linkage descriptor be excluded from the NIT.

8.6.11 DVB → ATSC, ATSC → DVB Conversion

When the output PSI mode is set to ATSC, some selected information will be translated from the DVB format to the ATSC format. Also the DVB has a larger reserved PID range than ATSC.

The following information is translated:

Service name

(DVB) SDT → (VCT) Short channel name

(VCT) Short channel name → (DVB) SDT

Audio AC3 descriptor

The AC3 audio component is signaled with different stream type in DVB and ATSC.

DVB stream type in PMT: 0x06

ATSC stream type in PMT: 0x81

In DVB the AC3 component has an additional AC3 descriptor in the PMT.

DVB → ATSC: Changes stream type and removes AC3 descriptor.

ATSC → DVB: Changes stream type and adds the Additional AC3 descriptor.

PID Ranges

DVB reserved PID range: 0 → 31

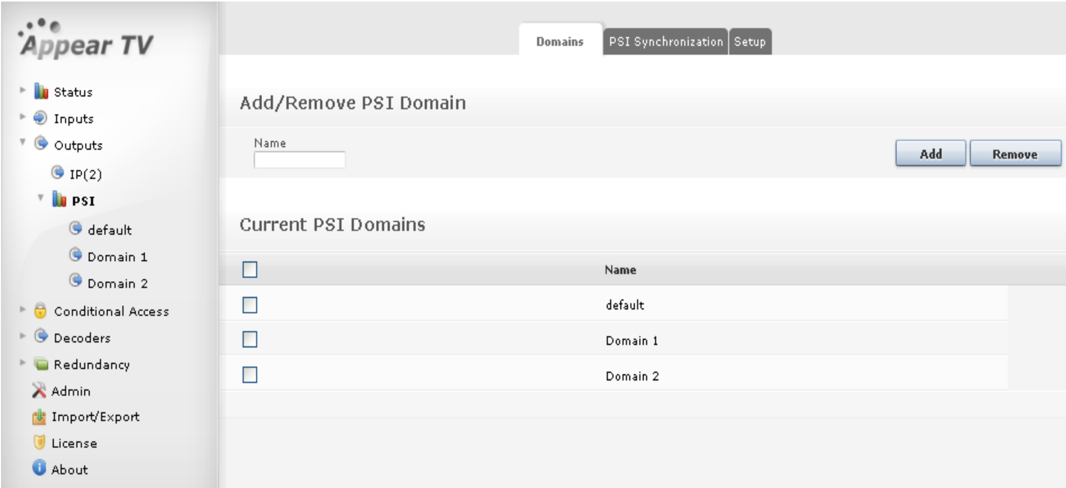
MPEG/ATSC reserved PID range: 0 → 16

The conversion from ATSC → DVB may therefore involve remapping of component PIDs if the incoming PIDs are in the reserved output range.

8.6.12 SI Domain Support

The SI Domain allows for multiple outputs to be defined with the same DVB triplet (NET ID, TS ID, SID) as some system designs require one unit to transmit on two different output domains, e.g. IP and cable.

In the *domain* concept, each domain is independent of each other with respect to SI validation and generation. In other words, within a unit the same output triplet, ie Network/Transport/Service ID, can be used as long as they belong to a separate domain.



This feature is not visible unless an additional output domain has been created. To create a domain, select **Outputs → PSI → Domains**. Then, enter an appropriate name for your domain in the **Name** field and click **Add.**

Once a new domain is created, the domain parameter will appear on the **Transport** tab (8.3.1). It is possible to add multiple output domains.

8.7 PMT Switching Configuration

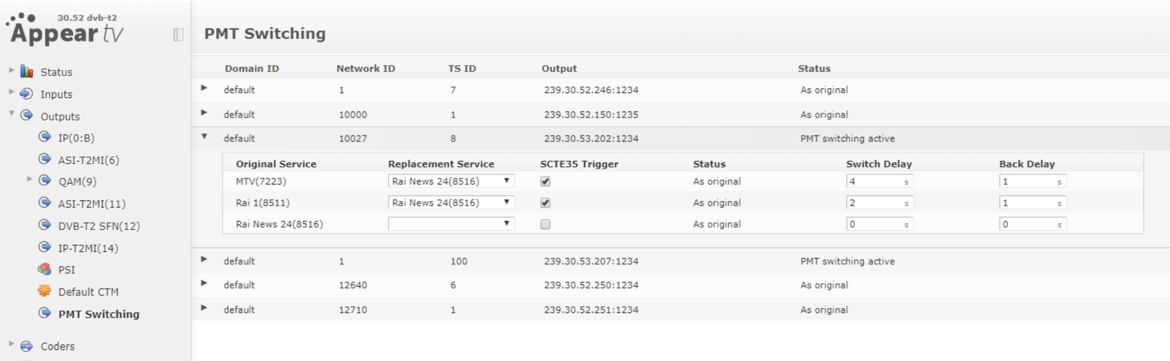
Content sharing allow services in one output stream to share video content that is being carried inside the output stream. The sharing is performed upon PMT switching (Licensed feature). One service can use a copy of another service's PMT to signal its elementary stream content, making the service stream the same content as the original one.

When license is installed, choose "PMT Switching" tab under Outputs. All configured outputs MPTS/MUX will be listed, and each service in each of them will be originally pointing to its own elementary stream content (components), showing "As original" in the "Status" column.

The elementary stream content of one output service can be manually replaced by the elementary stream content of a different service present in the same output MPTS/MUX by selecting that service in the "Replacement Service" drop-down menu, and clicking in "Apply". The "Status" column should show now "PMT switching active", as shown in the image below.

PMT switching triggered by SCTE35 messages can be enabled by ticking the checkbox for the desired service under "SCTE35 trigger" column. This switching will happen when the correct SCTE35 message is sent in-band in the enabled service. Please contact Appear TV support for more information about the supported SCTE35 message format.

Once the SCTE35 trigger is received, PMT switching happens after a "Switch delay", while switching back to the original elementary stream content will happen after "Back delay" once the corresponding SCTE35 message is received, applying the values configured in the corresponding columns, as shown in the image below:



The following parameters are listed under PMT switching:

Domain ID	If a domain has been configured, an additional drop down box will be visible. Refer to o for information on how to add a domain.
Network ID	Network identification selector.
TS ID	Transport Stream identification tag
Output	IP address of the output stream
Status	As Original: No Switching rules applied PMT Switching Active: By choosing a replacement service, the service output will become the content of the replacement service.
Switch Delay	Delay, in seconds, to wait until the switch is performed after SCTE35 message signaling is received
Switch back Delay	Delay, in seconds, to wait until the switch back is performed after SCTE35 message signaling is received

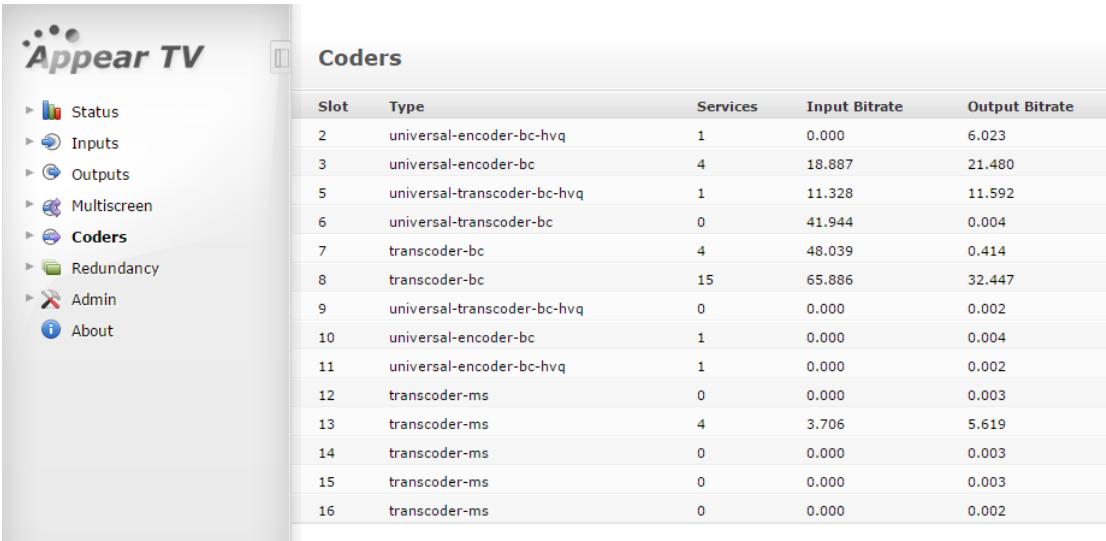
9 Encoder and Transcoder Configuration

9.1 General information

In the Appear TV platform, there are two categories of coder modules available. Encoder modules take uncompressed digital signals from SDI input ports while transcoder modules take compressed digital signals from the input cards in the unit. The output from all module types are compressed digital signals than can be routed to any of the output cards in the unit.

Encoding capabilities (HD/SD and the number of channels) of the encoder and transcoder modules can be changed via options and licenses. These modules are configured separately but have similar video encoding parameters. The common parameters for encoders and transcoders are described in the Encoder and Transcoder Parameter Guide.

The Coders view in the Navigation Pane gives a summary of the encoders and transcoders present.



The Coders View contains the following information:

Slot	Slot in which encoder is placed
Type	Type of coder module.
Service	Encoder: Number of services generated by the encoder module. Transcoder: The number of transcoded services.
Input Bitrate [Mbps]	The input bit-rate to Transcoder modules. Nothing is reported for encoders.
Output Bitrate[Mbps]	Total bit-rate including PSI/SI, transmitted to the backplane. The bit-rate may increase when a service is copied to multiple outputs.

9.2 Encoder Modules

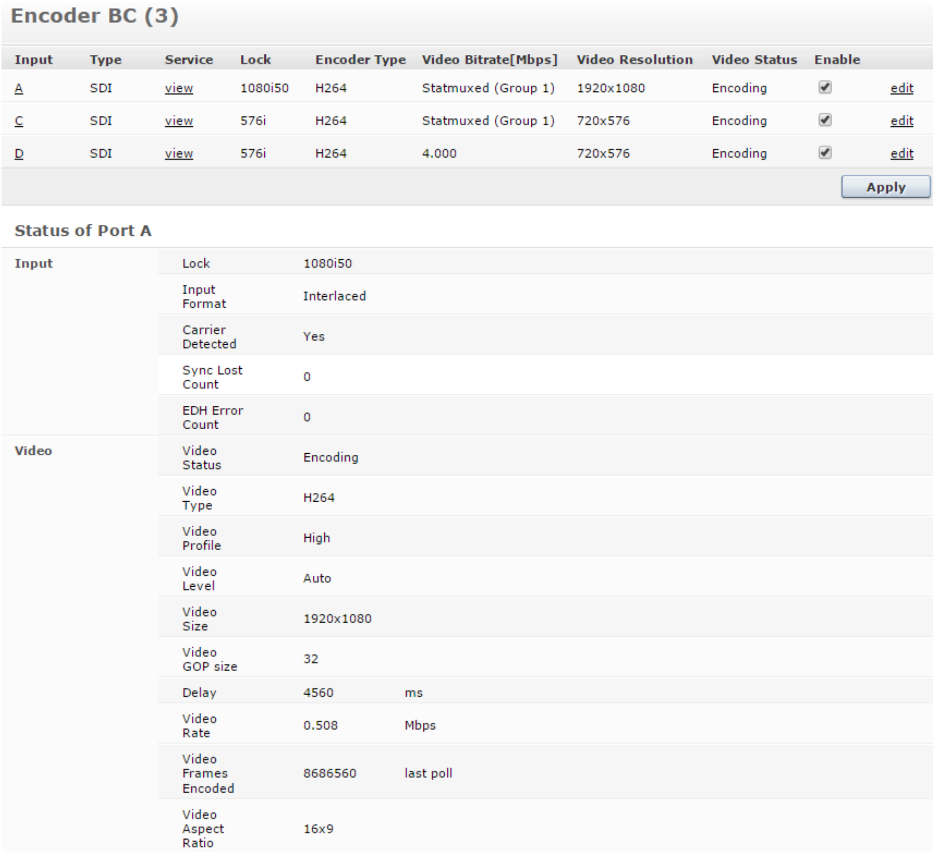
The following is an overview of the available Encoder modules and functionality available:

	Encoder-SD	Encoder-HD	Universal Broadcast High VQ	Universal Broadcast	Analog Encoder	RF Analog Encoder
Product	EC-200	EC-100 / EC-200	EC-400	EC-400	AC-100	AC-200
Max-SD	4 SD	2 SD	2 SD	4 SD	4 SD / 2 SD+PIP	4 SD / 2 SD+PIP
Max-HD	N/A	2 HD	1 HD	4 HD	N/A	N/A
Statmux	Yes		No		No	
Universal Statmux	No		Yes		No	
Video Input	480i: 30Hz/29.97Hz 576i: 25Hz	1080i: 30Hz/29.97Hz/25Hz 720p: 60Hz, 59.94Hz /50Hz	1080i: 29.97Hz /25Hz 720p: 59.97Hz /50Hz 480i: 29.97Hz 576i: 25Hz		PAL B/G/I/D/K SECAM D/K PAL Nc PAL M NTSC M	PAL B/G PAL I SECAM D/K*
Video Profile	High Main	High Main Baseline	High Main	High Main	High Main	High Main
Rate Control Mode	Constant Bit Rate (CBR) Capped VBR (CVBR) with QP target		Constant Bit Rate (CBR) Capped VBR (CVBR) with QP target		Constant Bit Rate (CBR) Capped VBR (CVBR) with QP target	
GOP Control	Fixed or Dynamic		Dynamic	Dynamic	Fixed or Dynamic	
Logo Insertion	Yes	Yes	Yes	Yes	Yes	Yes
Audio: Maximum Stereo Pairs per channel	MPEG-1:1 AAC-LC: 2 HE-AAC v1/2:1	MPEG-1:2 AAC-LC: 2 HE-AAC v1/2:2	MPEG-1:6 AAC-LC / HE-AAC v1/2:6 Dolby Digital :8 Dolby Digital Plus:8		MPEG-1 : 1 AAC-LC / HE-AAC v1/2:1	
Additional shared Stereo Pairs per module	MPEG-1:8 AAC-LC:4		N/A		N/A	
Dolby® Digital pass-through	Dolby Digital (AC-3)		Dolby Digital (AC-3) Dolby Digital Plus (E-AC-3)		N/A	
Dolby® E Decode	No		Yes	Yes	No	

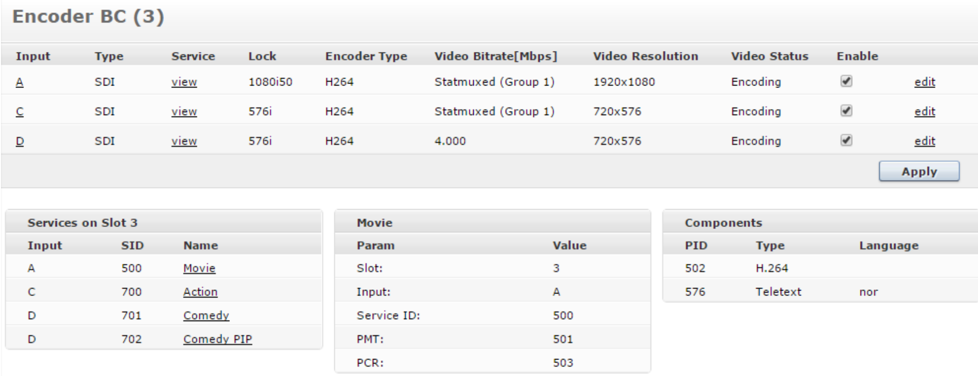
All Encoder modules are show under the **Coders** menu in the Navigation pane. This can be expanded to show the available modules, type and slot.

By clicking on these modules, you are presented an overview of the encoder ports and status:

Clicking on the port letter (ie A, B, C, D) under the 'Input' column will present the SDI and encoding status for this port:



Clicking on the Service Name will display the parameters for this service:

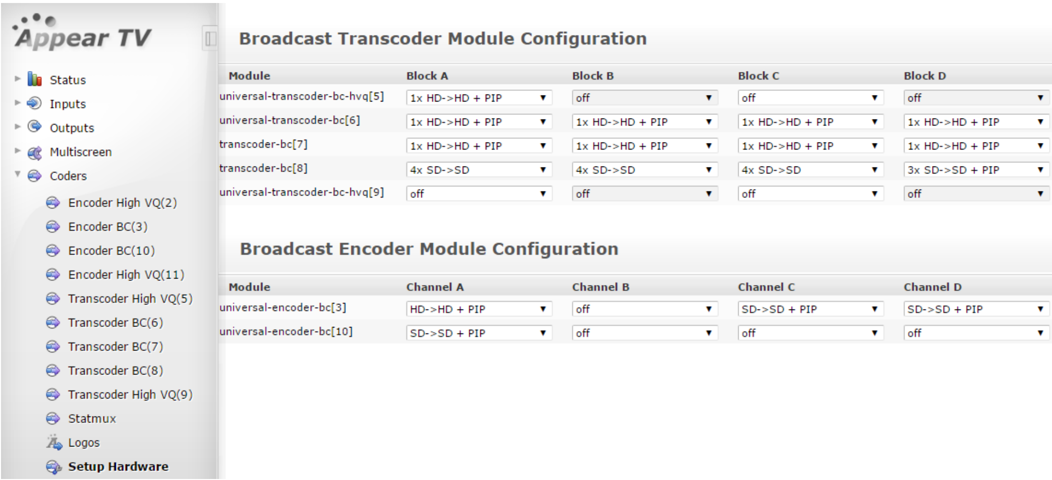


Parameters for the encoder port can be edited by clicking on the 'edit' link associated with each port.

In order to activate the port, the 'Enable' checkbox must be selected and the setting applied by clicking on the 'Apply' button.

9.2.1 Hardware Configuration (EC-400)

Depending on the mode of the hardware, it will be possible to configure the internal transcoder blocks (A, B, C and D) to different input/output resolutions, eg HD, SD, HD+PIP, SD+PIP. The overview and configuration of this is on the **Setup Hardware** page under the **Coders** tab in the Navigation Pane:



In order to change the mode of the block, select the correct option from the pull-down menu and click the 'Apply' button.

i	Re-configuring a block with existing channels will cause this block to be de-configured and the services removed from the output configuration.

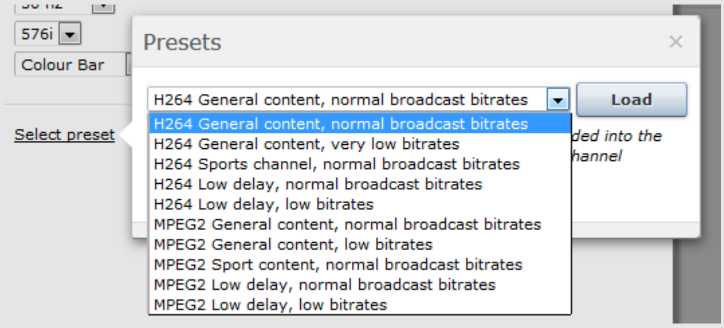
9.2.2 Source Configuration

9.2.2.1 SDI Encoder (EC-100, EC-200, EC-400)

Once SDI signals are connected to their respective input ports, the source parameters can be set on the **Source** tab on the encoder 'edit' dialog. Available parameters are:

Frame Rate	Frame rate of the incoming signal.

	Please note that this must match the input source.
Video Format	Video format of the incoming SDI signal. Please note that this must match the input source. Options presented here are dependent on the mode of the port (ie SD/HD)
Signal Loss	Colour Bar : Encoder Produces Colour Bar when input signal is lost. Black Picture: Encoder Produces Black Picture when input signal is lost. Use Logo (if available): Display logo configured on service
Signal Loss Timeout	Delay, in ms, before a Signal Loss is triggered after a loss of input SDI signal.
Force Signal Loss	Checkbox to enable a force of signal loss and trigger the 'Signal Loss' condition.
Preset	Configuration Presets can be used to help configuring the encoder optimally for a specific scenario with respect to content and/or bitrate:



These Presets are applied as a templates in the sense that even after a preset has been chosen; the user can access and alter all the parameters as normal.

9.2.2.2 Analog Encoder (AC-100, AC-200)

Once Composite/RF signals are connected to their respective input ports, the source parameters can be set on the **Source** tab on the encoder 'edit' dialog. Available parameters are:

RF Carrier Freq	RF frequency of input analog signal (RF Encoder only)
Signal Standard	Video format of the incoming Composite signal: • PAL B/G/I/D/K • PAL M • PAL Nc • SECAM D/K • NTSC M Please note that this must match the input source.
Audio Gain	Static audio gain applied to the input audio. Range is ±11 dB
Signal Loss	Colour Bar : Encoder Produces Colour Bar when input signal is lost. Black Picture: Encoder Produces Black Picture when input signal is lost. Use Logo (if available): Display logo configured on service

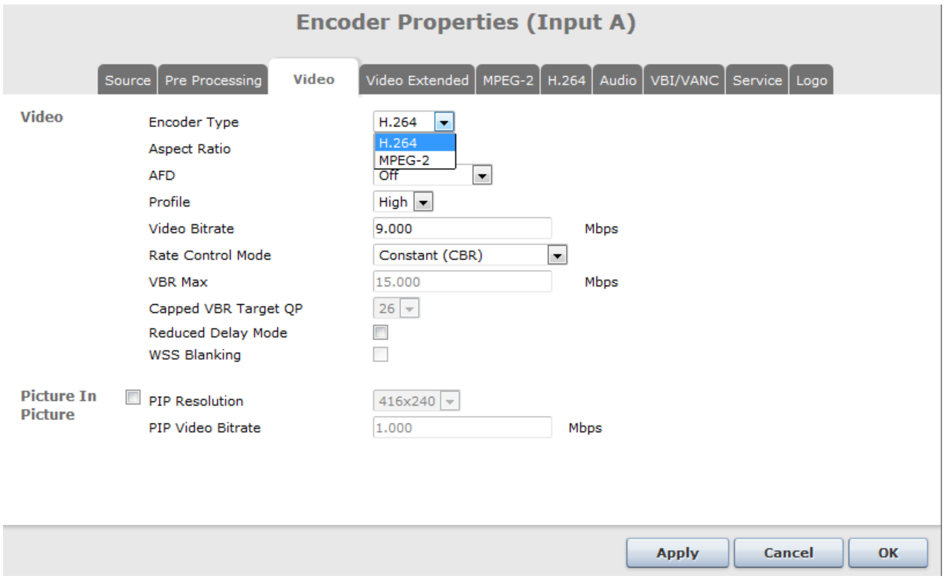
9.2.3 Pre-Processing Parameters

Pre-processing is a collective term covering all processing of the video signal done prior to the encoding process. The purpose of pre-processing is twofold.

Please see the Encoder and Transcoder Parameter Guide for more details on these parameters

9.2.4 Video Parameter Configuration

The following parameters are available for video configuration. The options available may depend on the module version.



Encoder Type	Selects compression standard to use. Available options are: H.264 (MPEG-4 part 10) or MPEG-2 video codec.
Profile	Selects the encoder profile to be used. The profile determines the range of tools from the codec "toolkit" that the encoder is allowed to utilize when encoding. The level is set automatically depending on the current configuration. MPEG-2: Simple, Main and High. H264: Constrained Baseline, Main and High.
Coding Mode	H.264: PFAF or Filed MPEG2: MBAFF or Field
Video Bitrate	Sets output bit-rate in CBR mode.
Rate Control Mode	Video CBR (Constant Bit Rate) or CVBR (Capped Variable Bit Rate).
VBR Max	Sets the bounds of the output bit-rate when the encoder operates in CVBR.
Capped VBR Target QP	When in CVBR mode, this sets the target Quantization Parameter of the encoder. High QP will result in more compression at the expense of quality. Low QP will result in higher bit-rate and better quality.

Aspect Ratio	Selects the aspect ratio to be signalled in the output video: • 16x9 • 4x3 • 1x1 • WSS or WSS (line 18) (Encoder only) • Video Index 11/324 or Video Index 8/321 (Encoder only)
AFD	AFD codes has below options: • Pass through: AFD codes transparent from SDI input to Video output stream. • Off: AFD codes are not passed from SDI input to video output stream.
Reduced Delay Mode	Enabling this mode reduces the encoding delay. Please note that enabling this feature will lead to less processing and therefore could impact picture quality at lower bitrates.
WSS Blanking	Enables WSS Blanking on the encoded output (Encoder only)
VITC	This controls the translation of Video Inserted Time Code (VITC) from VANC in the input to Video Elementary stream. VITC is used to accurately time stamp video frames.

Picture In Picture	Enable PIP video. This will generate a new selectable service for use on any of the output modules. Both share the same audio.
PIP Resolution	Sets the resolution of the PIP video.
PIP Video Bitrate	Sets the bit-rate of the PIP video. Range: 250kbps to 1Mbps

The CBR video bit-rate affects only the video PID. An IP output may still be a VBR transport stream. Some IP receivers require that the IP output is set to CBR mode. This can be set on the **Port Settings** tab of the output stream

9.2.5 Video Extended, MPEG-2 and H.264 Parameters

Please see the Encoder and Transcoder Configuration Guide for more details on these parameters

9.2.6 Audio Configuration

Audio encoding capabilities and capacity are restricted by hardware and licensing. Depending upon hardware the encoders support one or more of the following audio encoding formats

- MPEG-1 layer 2 encoding
- AAC-LC, HE-AACv1 and HE-AACv2 encoding
- Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) multi-channel encoding and pass-through

Please refer to the encoder datasheet and license information for specifics on what is supported. The following sections outline the parameters supported for each audio format and how/where these are configured.

9.2.6.1 Audio Support (EC-100, EC-200, AC-100, AC-200)

On the encoder module, there are one (for SD or Analog mode) or two (for HD mode) general purpose audio encoders per channel. These channels support MPEG-1, AAC-LC, HE-AACv1 and HE-AACv2 encoding and Dolby Digital (AC-3) pass through. In addition there are up to 12 MPEG-1 encoders or 4 AAC-LC encoders that can be distributed among the channels on a board. A mixture of MPEG-1 and AAC encoders are allowed per board and this is outlined in the table below.

AAC-LC codec	MPEG-1 codec	Total encoders per card.
0	12	12
1	9	10
2	6	8
3	3	6
4	0	4

If Dolby Digital (AC-3) is present on the input signal (embedded SDI or AES), this can be passed through to the encoded output service

9.2.6.2 Audio Support (EC-400)

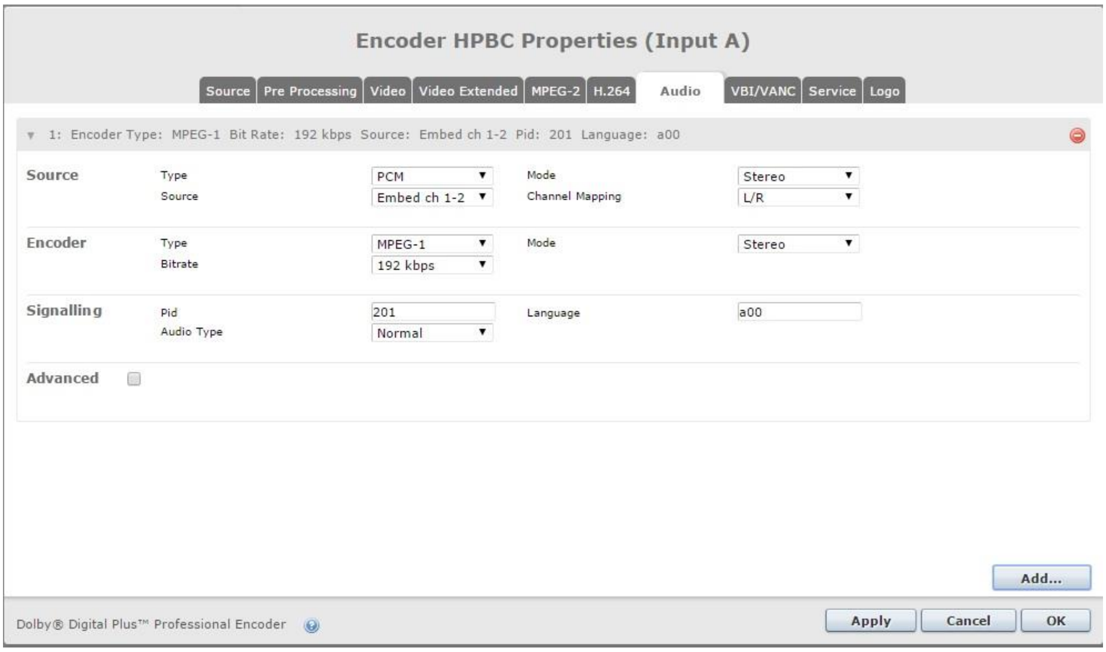
The EC400 high performance broadcast encoder can do 4 stereo pairs per encoded video. This can be a mix of MPEG-1(0x03) layer 2, MPEG-1(0x04) layer 2, AAC-LC, HE-AAC v1/v2, Dolby Digital and Dolby Digital Plus.

MPEG-1(0x03) layer 2, MPEG-1(0x04) layer 2, AAC-LC, HE-AACv1 and HE-AACv2 capacity is licensed in one combined license, where one license allows for the encoding of one stereo pair.

Dolby Digital and Dolby Digital Plus encoding capacity is licensed in one combined license, where one license allows for the encoding of one stereo pair. One 5.1 encoding requires three licenses, and one 7.1 encoding requires four licenses.

9.2.6.3 Audio Parameter Configuration

Audio streams/encoders are added and configured on the audio tab on the encoder properties page. The available options will vary depending upon the number of unused audio licenses and hardware capability.



- Use the 'Add' button on the bottom of the page to instantiate an audio encoder.

- Use the red '–' button to the right of the channel heading to disable and remove the audio encoder.

i	EC-100 / EC-200: One or two (SD/HD mode) audio encoders per SDI input channel are always available in the GUI. These encoders can be turned off by removing the enable selection in the upper right corner.

Encoder properties are split into four sections: '**Source**', '**Encoder**', '**Signalling**' and '**Advanced**'. See tables below for more detailed information on the available choices.

- The available choices are automatically updated based on the current selections. For example if 'Encoder Type' is Dolby Digital or Dolby Digital Plus the 'Advanced' section will change accordingly and present additional settings.
- Changing 'Source Mode', 'Encoder Type' or 'Encoder Mode' resets all selections to their default values for the chosen combination of the aforementioned three settings.

i	Choices are automatically checked for dependencies and invalid selections are either marked red or changed to a legal selection. It is not possible to press "Apply" or "OK" until any inconsistencies have been corrected.

Source

Type	PCM, Dolby Digital or Dolby Digital Plus pass-through or Dolby-E
Mode	Stereo, Mono, Dual Mono, 3/2 +LFE (5.1) or 3/4+LFE (7.1)
Source	Embedded SDI channel selection
Channel Mapping	This allows the multichannel input mapping to be specified • L/R : left and right **front** channels • C : centre channel • LFE : low frequency effects channel • Ls/Rs : left and right **surround** channels • Lb/Rb : left and right **back** channels

Encoder

Type	Dolby Digital, Dolby Digital Plus, MPEG-1 , AAC, HE-AACv1, HE-AACv2
Channel Mode	Output channel format. Available choices depend on selected Source Mode and Encoder Type • Stereo • Mono • Dual Mono • 3/2 +LFE (5.1) • 3/4+LFE (7.1)

	If Source Mode is larger than Encoder Mode, then down-mixing is automatically performed. Dolby Digital Plus supports up-mixing from Source Mode 3/2 +LFE (5.1) to Encoder Mode 3/4+LFE (7.1).
Bitrate	Bitrate of compressed audio, available choices depend on Encoder Type and Mode.
Container	ADTS or LATM (Encoder Type AAC, HE-AACv1 and HE-AACv2 only)
Bitstream Mode	Dolby Digital/Dolby Digital Plus audio service description
Dialogue Normalization	Dolby Digital/Dolby Digital Plus setting used for aligning the output level based on the set level of dialogue. Important to configure correctly for current source content to achieve an even output level across services.

Signalling

PID	The PID value of the compressed audio stream.
Language	Three letter audio code used in PMT. Example "nor", "eng"
Audio Type	Audio type signalled in PMT • Normal • Clean Effect • Hearing Impaired • VI Commentary More details can be found in Ref. ITU-T Rec. H.222.0

Advanced (All coder types)

Lip Sync Adjustment	-200ms to +500ms adjustment to the lip sync
Level Adjustment	+20 to -20 dB adjustment to the input level

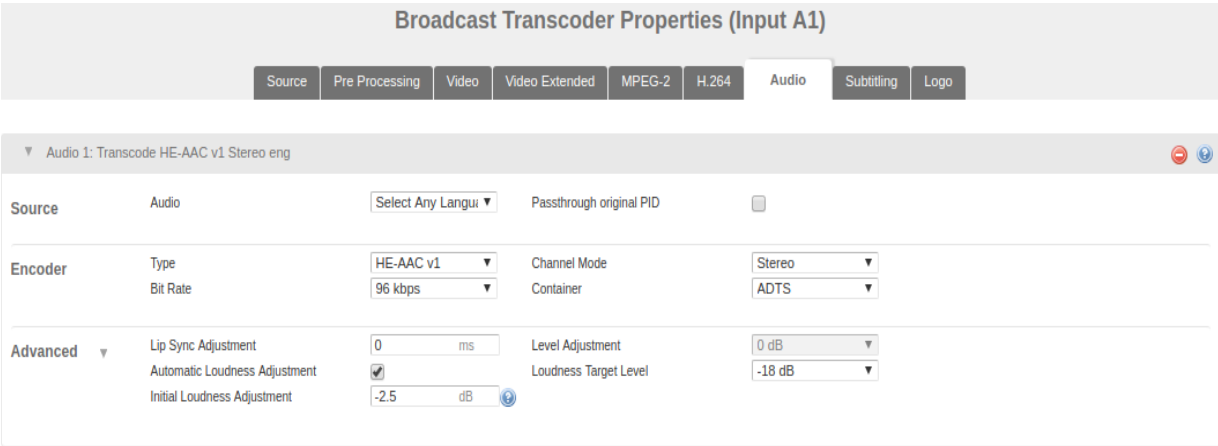
Advanced (Only Universal Encoder)

PES Alignment	Enables fixed Audio alignment in PES

9.2.6.4 Audio Automatic Levelling Adjustment Configuration

Automatic loudness adjustment is a feature for setting up groups of audio with the same output gain/loudness level. These groups are defined by the target level, which is set upon creation.

Applying automatic loudness adjustment is done under Audio and Advanced section for each channel



The following parameters are available for Automatic Loudness Adjustment configuration

Enable	Enable/disable Automatic Loudness Adjustment feature.
Initial loudness adjustment	Input field with valid range [-20 dB to 20 dB] If initial gain is set to 0 the application will begin measurements at 04.00 a.m. next day, and after measuring for 24 hours will fast forward the result the next night.
Target loudness level	Drop down menu showing range [-18 dB to -31 dB]

The initial value is the starting point for the measurements and will be applied as a regular gain to the audio.

- If the initial value is zero (0) the application will being at 04.00 the following night.
- If the initial value is non-zero the application will begin immediately and start adjusting by +/- 0.5 db at 04.00, if needed.

Status of Audio Automatic Levelling Adjustment

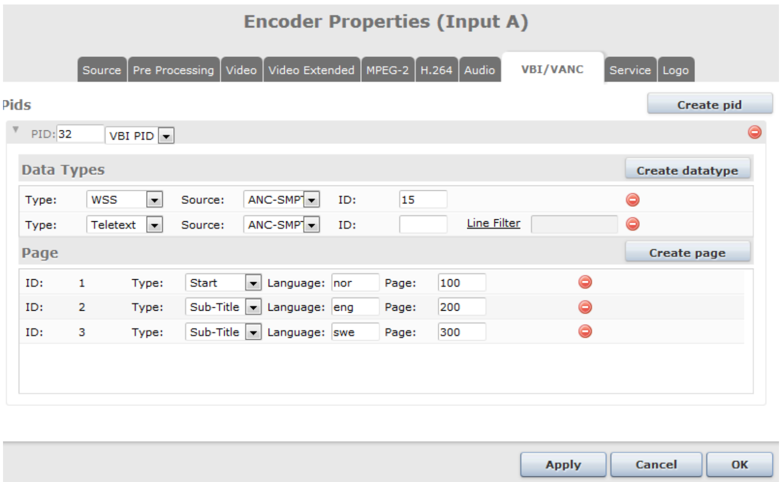
Audio 1				
	Basic Config			
		Audio Out Encoder Codec Type	AAC-LC	
		Audio Out Channel Mode	Stereo	
		Audio Out Bit Rate	128	kbps
		Audio Out Sample Rate	48000	Hz
		Audio In Decoder Codec Type	PCM	
		Audio In Channel Mode	Stereo	
	Automatic Loudness Measurement			
		Loudness Enabled	Yes	
		Loudness Per Hour	-70.00	LUFS
		Service Loudness	-70.00	LUFS
		Encoder Gain	0.0	dB
		True Peak	-100.00	dBTP

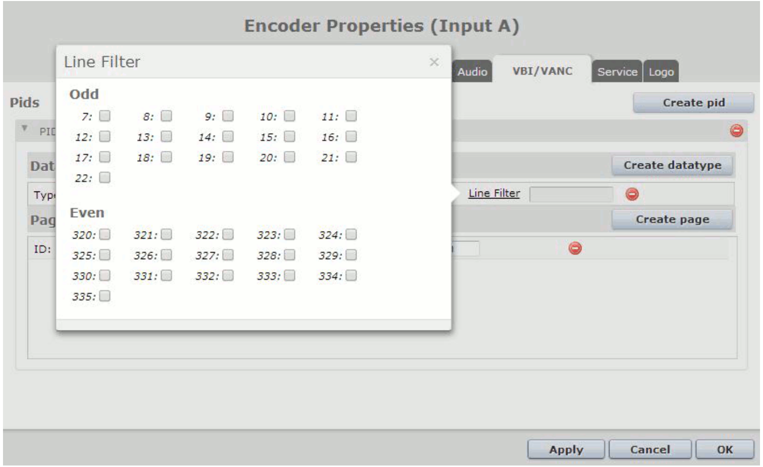
True Peak	Source level cannot be equal or exceed -1LUFS

9.2.7 VBI/VANC Parameters

The VBI/VANC tab allows you to create Private Data PIDs and configure the PSI/SI descriptors based on VBI or VANC information in the input SDI signals.

The source data can be embedded in the SDI signal in the VBI (Vertical Blanking Interval) or in the VANC (Vertical Ancillary)





A PID can be created by clicking on the 'Create pid' button and it is possible to create up to 3 unique PIDs. The figure above shows the GUI to configure the Data information and Page information. Click on the 'Create datatype' button to add a new data type. If the data type is teletext, click on the "Create page" button to create page information for the descriptor.

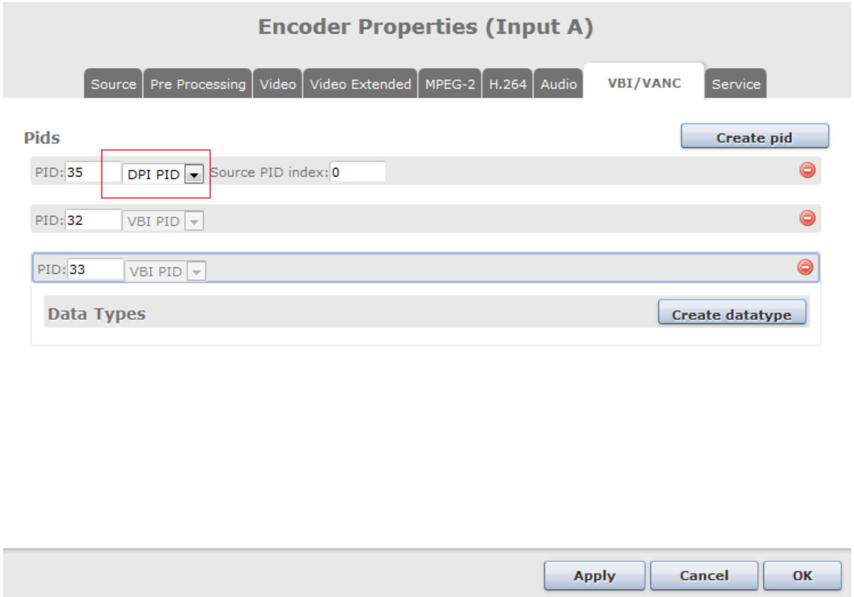
Only one PID definition is displayed in detail. To show another definition, click on the PID header.

The following parameters are available for VBI/VANC configuration:

PID	Private Data PID value. Range: 32-8190
Data Type	Options: Teletext, WSS or VPS
Data Source	Where in the SDI signal to receive the data from. Options: VBI, OP-47 and SMPTE-2031.
Line Filter	Specify teletext line/s to be filtered.
Data ID	Needed for SMPTE-2031 to uniquely identify the data type as the standard allows one data type to appear more than once.
Page	Page information used to create the teletext descriptor. Up to 6 pages can be created.
Page Type	Type of teletext page. Options: Start and Sub-Title. Start page for teletext defining which page the TV/Receiver shall show when teletext is switched on. Subtitling page specifying the page the TV/Receiver shall show when a specific subtitling language is selected.
Page Language	Three letter language code for the start page and subtitling page. There can be several start pages and subtitling pages in a teletext stream with different languages.
Page Number	The page number for the start pages and the subtitling pages. Range:100-899

Digital program insertion (DPI) receives the DPI information as ancillary data according to SCTE-104 and converts the data into SCTE-35. The DPI data PID is added to the transport stream.

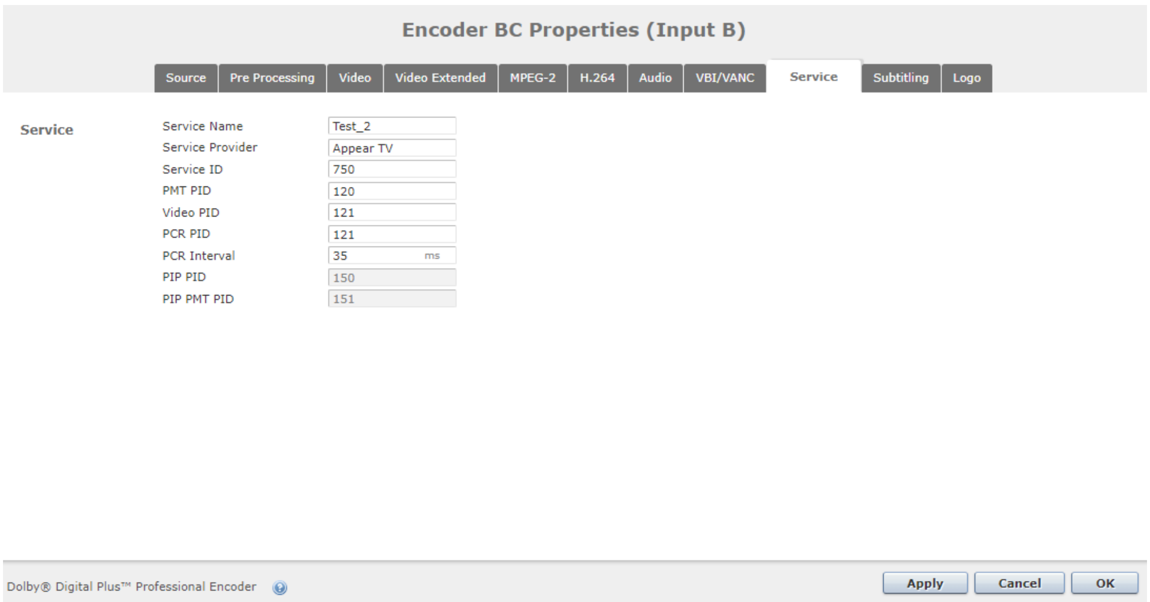
The user can enable or disable DPI, select the PID value and select the source PID index on the VBI/VANC page in the GUI. The SCTE-104 supports data transmission of more than one source PID index. The list of incoming indexes is shown on the status page. This PSI/SI for DPI is added to the output PMT.



The status found by clicking on the Port on the status and configuration page provides useful information when configuring the VBI/VANC. Teletext, subtitling pages, WSS and VPS status is given for VBI, SMPTE-2031 and OP-47.

9.2.8 Service Parameters

The following default parameters are available for service configuration. The Components tab of the output card can also be used configure different PID values and components on each output port.



Service Name	Service Name for the encoded stream.
Service Provider	Name of the Service Provider for the encoded stream.

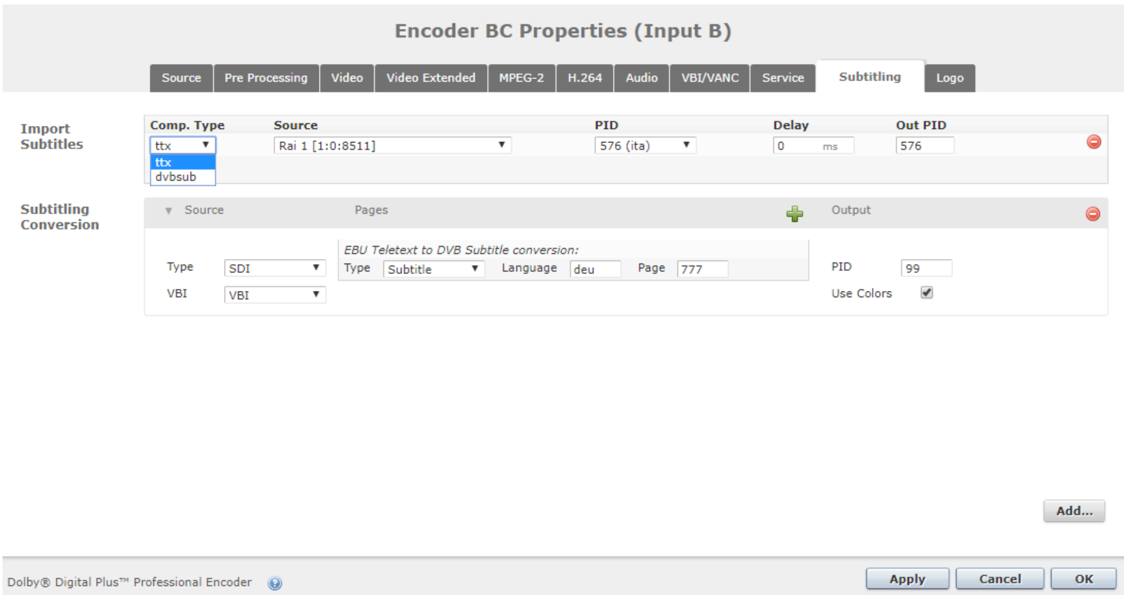
Service ID	Service ID for the encoded stream.
PMT PID	Default PMT PID for the encoded stream.
Video PID	Default Video PID for the encoded stream. Valid Range: 32-8190
PCR PID	Default PCR PID for the encoded stream. If PCR and video PID have the same value, PCR is embedded with the video. Valid Range: 32-8190
PCR Interval	PCR Interval for the encoded stream. Valid Range: 1-250ms.
PIP PID	Default PIP Video PID for the encoded stream. Valid Range: 32-8190. PCR is always embedded on the PIP Video PID.
PIP PMT PID	Default PIP PMT PID for the encoded stream. Valid Range: 32-8190

9.2.9 Subtitling

Two different features can be configured in this tab if the corresponding licenses are installed:

- Import Subtitles from a PID from an external source into the service, re-stamping the PTS accordingly
- Conversion from Teletext/EBU subtitles to DVB subtitles

The parameters displayed for "Subtitling" tab are shown in the picture below:



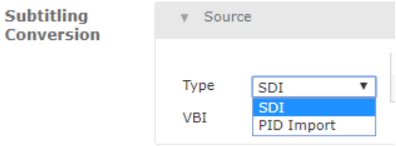
In order to import DVB and Teletext subtitle PIDs, click on the '+' icon in the **Import Subtitles** section, and then select all the parameters as described below:

Comp. Type	Select if subtitles to be imported are Teletext/EBU (**ttx**) or DVB (**dvbsub**)
Source	Drop down list for selecting source of subtitle PID
PID	PID number with subtitle.
Delay	Delay time must be specified in milliseconds. Valid range: 0 – 2000 ms.

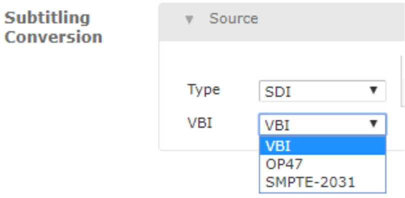
Out PID	Outgoing PID with subtitle.

If the user wants to enable Teletext/EBU-to-DVB subtitles conversion, user must click on 'Add…' button on the bottom right.

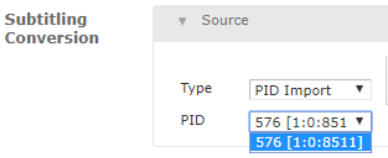
First step is to indicate where the Teletext/EBU subtitles are coming from in the "Source" sub-section:



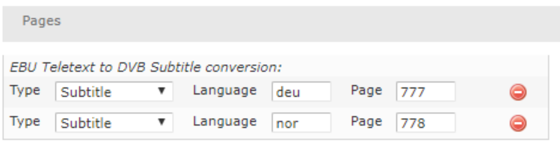
If the Teletext/EBU subtitles are embedded in the SDI input signal, select "SDI". A "VBI" drop-down menu will be presented to choose what standard is used for embedding subtitles in SDI:



If "PID Import" is selected instead, the Teletext/EBU subtitles PID will be imported from a different input source, and then converted into DVB. In that case, the user must indicate the Input Source and the PID in that Input Source to import the PID from:



Once the Source is properly configured, the user must configure the Pages where the subtitles are present within the Teletext:



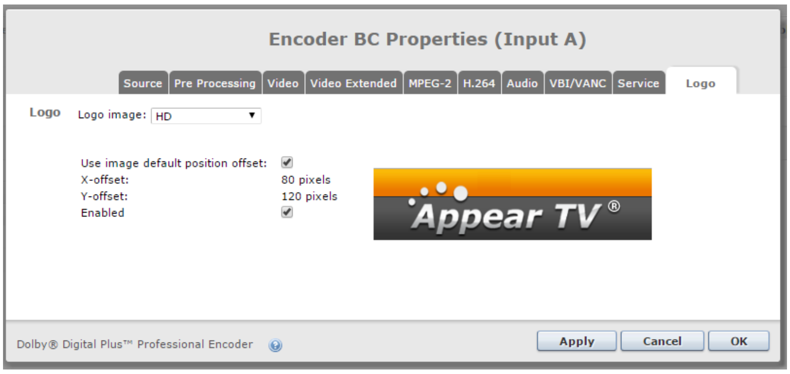
Type	User can select if the selected page contains regular "Subtitles" or "Hearing Impared Subtitles"
Language	Language of the subtitles in the configured page
Page	Page where the subtitle is found

Last step is to configure the Output settings after the subtitling conversion:

PID	Outgoing PID number for the converted subtitling component
Use Colors	If Enabled and the Teletext/EBU subtitling source contained color formatting, this formatting will be applied accordingly in DVB subtitles during conversion

9.2.10 Logo Insertion

Once there is a valid logo on the MMI, then it is possible to assign this to a transcoder channel. This is configured on the Logo tab:



Once the correct logo resolution is chosen for the service and the offset set, the logo can then be enabled.

If this logo is to be used for insertion on a signal loss, then the logo will need to be configured, but not enabled.

9.3 Transcoder Modules

The following is an overview of the available Encoder modules and functionality available:

	Transcoder-SD	Transcoder –HD	Universal High VQ Transcoder	Universal Dense Transcoder	Universal Dense Transcoder
Product	TC-100	TC-100	TC-400	TC-200	TC-400
Max-SD	4 SD	2 SD	2 SD	16 SD	
Max-HD	N/A	2 HD	1 HD	4 HD	
Statmux	Yes		No		
Universal Statmux	No		Yes		
Video Input	480i: 30Hz/29.97Hz 576i: 25Hz	1080i: 30Hz/29.97Hz/25Hz 720p: 60Hz, 59.94Hz /50Hz	1080i: 29.97Hz /25Hz 720p: 59.94Hz /50Hz 480i: 29.97Hz 576i: 25Hz		
Video Profile	High Main	High Main Baseline	High Main		
Rate Control Mode	Constant Bit Rate (CBR) Capped VBR (CVBR) with QP target		Constant Bit Rate (CBR) Capped VBR (CVBR) with QP target		
GOP Control	Fixed or Dynamic		Dynamic		
Sub-title Burn-in	No		Yes. Maximum 4 per module		
Logo Insertion	No		Yes		

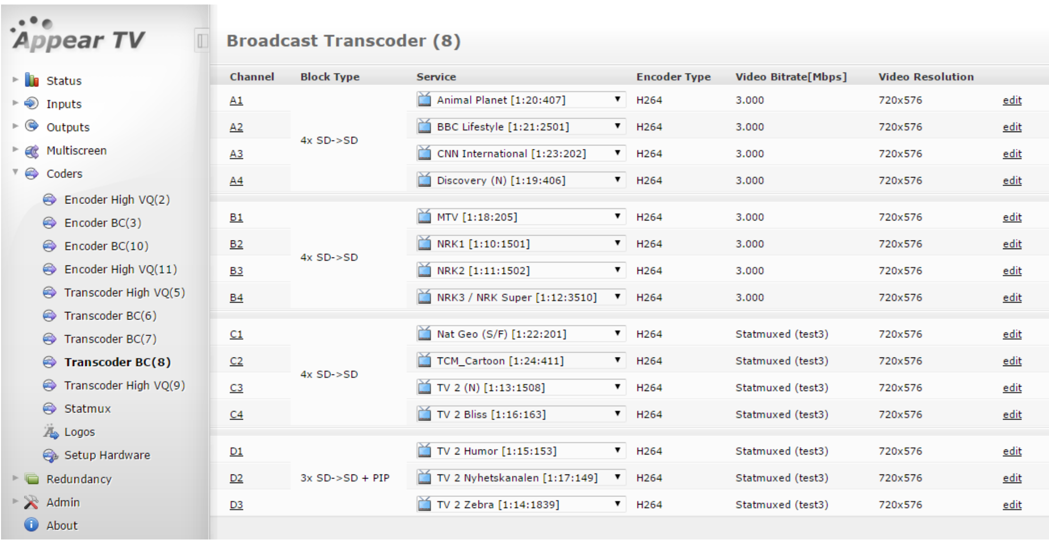
<table>
<tr><td>Audio: Maximum Stereo Pairs per channel</td><td>MPEG-1:1
AAC-LC: 2
HE-AAC v1/2:1</td><td>MPEG-1:2
AAC-LC: 2
HE-AAC v1/2:2</td><td>MPEG-1:4
AAC-LC / HE-AAC v1/2:4</td><td colspan="2">MPEG-1:4
AAC-LC / HE-AAC v1/2:4
Max total 12 per module</td></tr>
<tr><td>Additional shared Stereo Pairs per module</td><td colspan="2">MPEG-1:8
AAC-LC:4</td><td colspan="3">N/A</td></tr>
<tr><td>Dolby® E Decode</td><td colspan="2">No</td><td>Yes</td><td>No</td><td>No</td></tr>
</table>

In the Appear TV platform, the transcoder module is used to receive services from any of the input cards and change the codec, bit-rate or resolution of the service which can then be routed to any of the output modules. When configured, the input video is decoded, rescaled and then re-encoded.

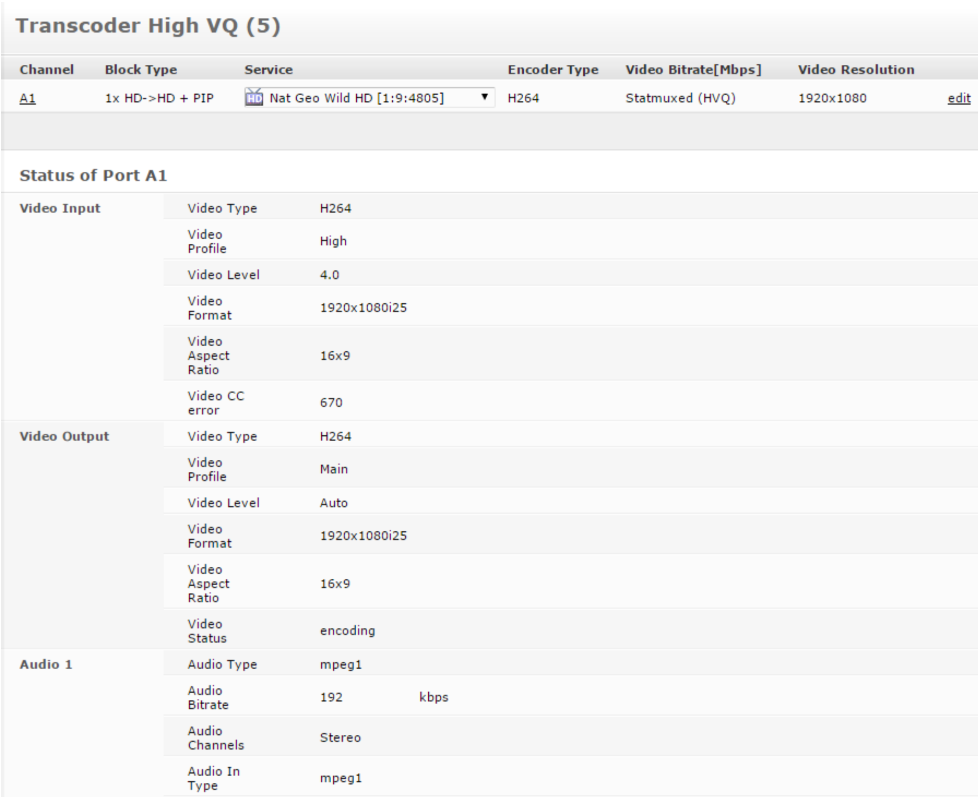
All incoming PIDs that are not transcoded will be kept in sync with video after transcoding and are able to be configured on the output service.

All Transcoder modules are show under the **Coders** menu in the Navigation pane. This can be expanded to show the available modules, type and slot.

By clicking on these modules, you are presented an overview of the transcoder ports and status:



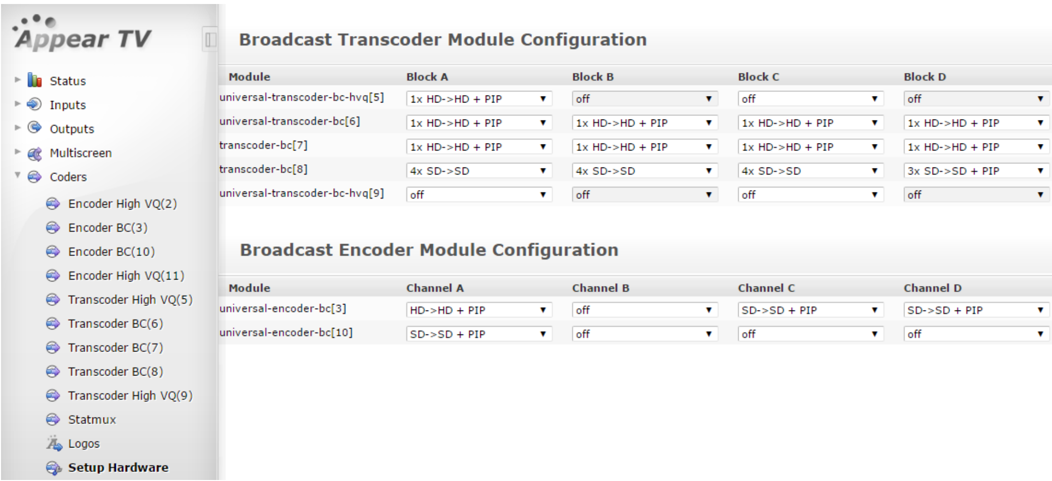
Clicking on the port letter (ie A, B, C, D) under the 'Channel' column will present the decoding and encoding status for this port:



Parameters for the transcoder port can be edited by clicking on the 'edit' link associated with each port.

9.3.1 Hardware Configuration (TC-200, TC-400)

Depending on the mode of the hardware, it will be possible to configure the internal transcoder blocks (A, B, C and D) to different input/output resolutions , eg HD, SD, HD+PIP, SD+PIP. The overview and configuration of this is on the **Setup Hardware** page under the **Coders** tab in the Navigation Pane:



In order to change the mode of the block, select the correct option from the pull-down menu and click the 'Apply' button.

i	Re-configuring of a block with existing channels will cause this block to be de-configured and the services removed from the output configuration.

9.3.2 Service Configuration

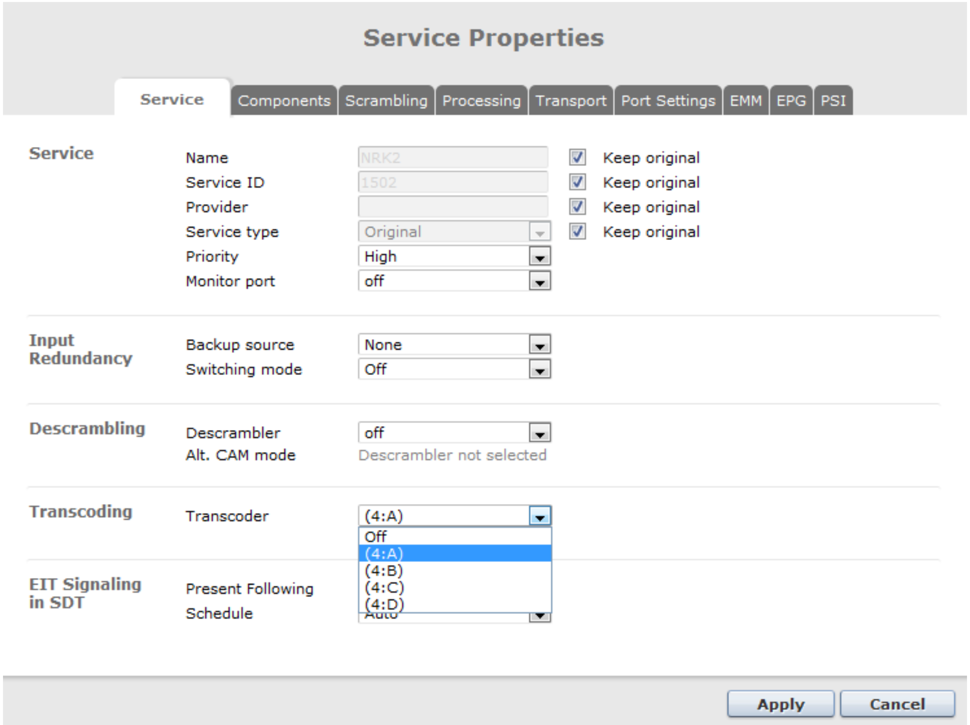
9.3.2.1 TC-200 and TC-400

Transcoder input service selection is done by using the pull-down box in the port list. This will display and allow you to choose from any input source currently present in the unit. Once this selection is made, the transcoder channel is activated.

9.3.2.2 TC-100

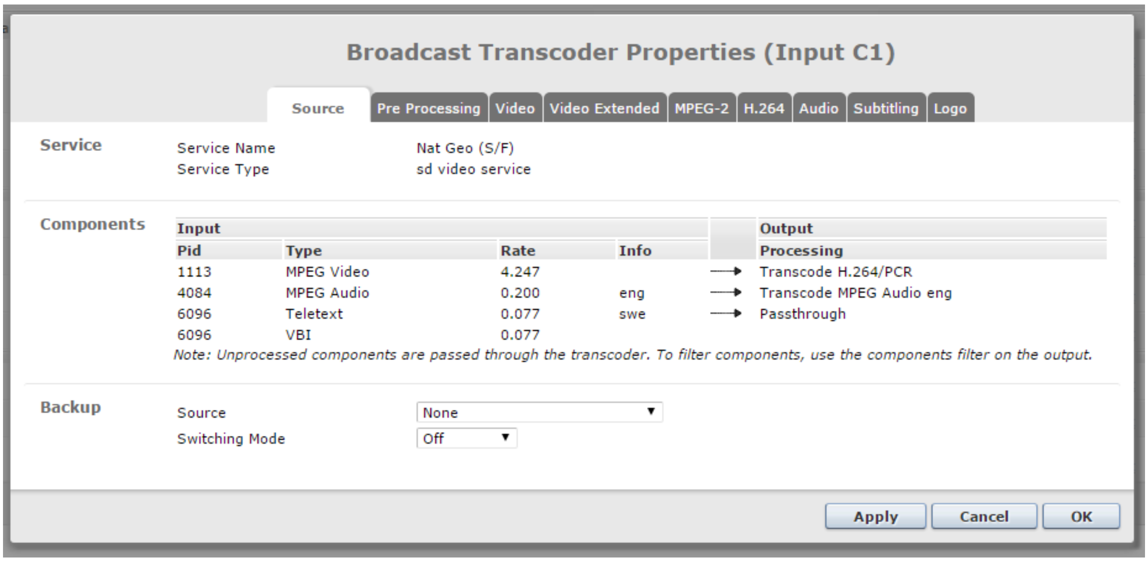
In order to assign a transcoder resource to a stream, you will first need to configure an output service. Transcoding is then enabled by selecting an available transcoder channel on the **Service** tab of the Service Properties page.

The Name, Service ID, Service type and PID values of the input stream are all kept unchanged unless it is changed in the Service Properties page. The PSI/SI will be changed for the PIDs that are changed by the Transcoder.



9.3.3 Source Parameters

For viewing transcoder source parameters, please select the **Source** tab.



The following parameters are available:

Service Name	The name of the incoming service that are transcoded. This field is empty if no service is selected.
Service Type	Service type received for this service. This is meta data in DVB SI and may not correspond to the actual video codec and format received. The service type corresponds to the Service type settings in the Service tab of each output board and can be changed if required
Component	Details on received components for the selected service: • PID -> PID number received • Type -> Type of component for selected PID • Rate -> Bit-rate for selected PID • Info -> additional information such as language code • Output -> PID reference of the output component and processing

Backup Source	Here a valid input service can be selected as a Backup Source for the currently selected main service
Switching Mode	Off, Once, Floating or Reverting

9.3.4 Pre-Processing Parameters

Pre-processing is a collective term covering all processing of the video signal done prior to the encoding process. The purpose of pre-processing is twofold.

Please see the Encoder and Transcoder Parameter Guide for more details on these parameters

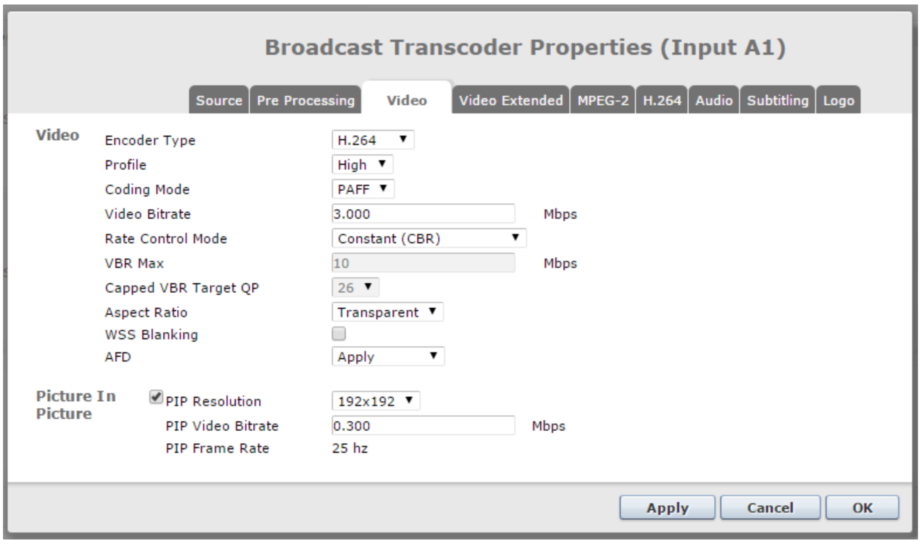
The following options are available for PCR of the transcoded service:

As source	The PCR is passed through on the incoming PID value.

Video PID	The PCR is embedded on the video PID regardless of origin.
Separate PID	The PCR is sent on a separate PID regardless of origin. Default PCR PID is 8180. It will only get this default value if that PID value is not already in use in the transport stream.

9.3.5 Video Parameter Configuration

The following parameters are available for video configuration:



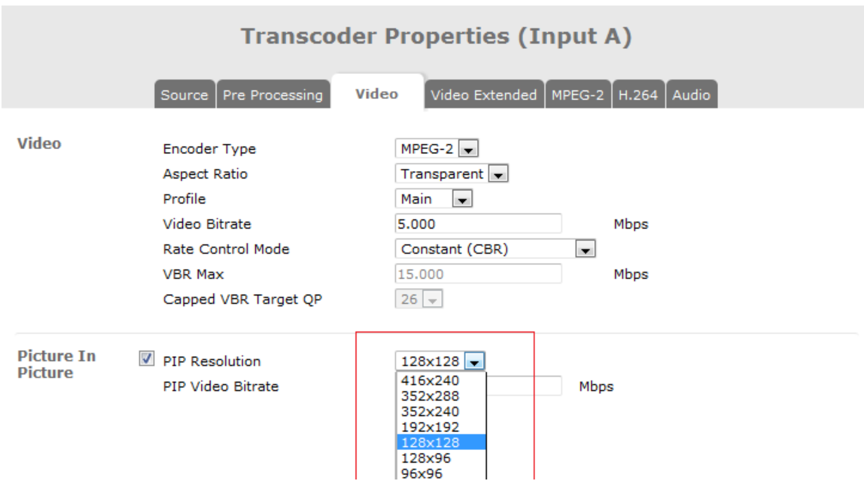
Encoder Type	Selects compression standard to use. Available options are: H.264 (MPEG-4 part 10) or MPEG-2 video codec.
Profile	Selects the encoder profile to be used. The profile determines the range of tools from the codec "toolkit" that the encoder is allowed to utilize when encoding. The level is set automatically depending on the current configuration. MPEG-2: Simple, Main and High. H264: Constrained Baseline, Main and High.
Coding Mode	H.264: PFAF or Filed MPEG2: MBAFF or Field
Video Bitrate	Sets output bit-rate in CBR mode.
Rate Control Mode	Video CBR (Constant Bit Rate) or CVBR (Capped Variable Bit Rate).
VBR Max	Sets the bounds of the output bit-rate when the transcoder operates in CVBR.
Capped VBR Target QP	When in CVBR mode, this sets the target Quantization Parameter of the encoder. High QP will result in more compression at the expense of quality. Low QP will result in higher bit-rate and better quality.
Aspect Ratio	Selects the aspect ratio to be signalled in the output video: • 16x9

	• 4x3 • 1x1 • Transparent
WSS Blanking	Enables WSS Blanking on the transcoded output
AFD	AFD codes has below options: • Pass through: Incoming AFD codes are not applied, but passed through to video output stream. • Apply: Incoming AFD codes are applied to video output stream. • Remove: Incoming AFD codes are not applied and removed from the video output stream.

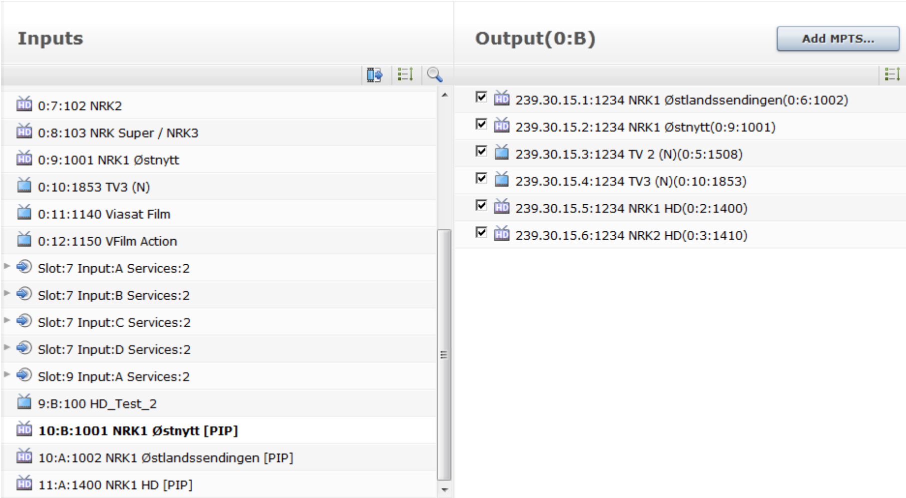
Picture In Picture	Enable PIP video. This will generate a new selectable service for use on any of the output modules. Both share the same audio.
PIP Resolution	Sets the resolution of the PIP video.
PIP Video Bitrate	Sets the bit-rate of the PIP video. Range: 250kbps to 1Mbps

The CBR video bit-rate affects only the video PID. An IP output may still be a VBR transport stream. Some IP receivers require that the IP output is set to CBR mode. This can be set on the **Port Settings** tab of the output stream

Transcoder PIP is from the default PID values as the Main service whereas Encoder PIP PID value is configured on the service page.



The PIP service appears on the Input list and can be sent to the output as any other input service.



The output page for a PIP service is different to a normal input as transcoding is not allowed and descrambling is not necessary.

9.3.6 Video Extended, MPEG-2 and H.264 Parameters

Please see the Encoder and Transcoder Configuration Guide for more details on these parameters.

9.3.7 Audio Configuration

Audio transcoding capabilities and capacity are restricted by hardware and licensing. Depending upon hardware the transcoder support one or more of the following audio encoding formats

- MPEG-1 layer 2 encoding
- AAC-LC, HE-AACv1 and HE-AACv2 encoding
- Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) decoding and pass-through

Please refer to the transcoder datasheet and license information for specifics on what is supported. The following sections outline the parameters supported for each audio format and how/where these are configured.

9.3.7.1 Audio Support (TC-100)

The audio transcoder can receive MPEG-1/AAC –LC/AAC-HE compressed audio from the transport stream. Dolby Digital or Dolby Digital Plus components can only be set to pass-through.

There are up to 12 MPEG-1 encoders or 4 AAC-LC encoders that can be distributed among the channels on a module. A mixture of MPEG-1 and AAC encoders are allowed per board. See table below.

AAC-LC codec	MPEG-1 codec	Total encoders per card.
0	12	12
1	9	10
2	6	8
3	3	6
4	0	4

9.3.7.2 Audio Support (TC-200, TC-400)

The following Audio types are supported in the audio decoder:

- MPEG1 Layer 2 (2.0) (TC-200 only)

- MPEG1 (0x03) Layer 2 (2.0), MPEG-1(0x04) layer 2(TC-400 only)
- AAC-LC (2.0)
- HE-AACv1 (2.0)
- HE-AACv2 (2.0)
- Dolby Digital (2.0/5.1)/Dolby Digital Plus (2.0/5.1/7.1) (TC-200 only)

Audio Downmix : Multichannel audio (5.1 or 7.1) will be down-mixed to 2.0 as part of transcode process.

The transcoder module is limited to encoding 12 stereo pairs per 2 blocks with an additional limit of maximum 4 stereo pairs per channel. The following Audio types are supported in the audio encoder:

- MPEG1 (0x03) Layer 2 (2.0), MPEG-1(0x04) layer 2, : AAC-LC (2.0)
- HE-AACv1 (2.0)
- HE-AACv2 (2.0)

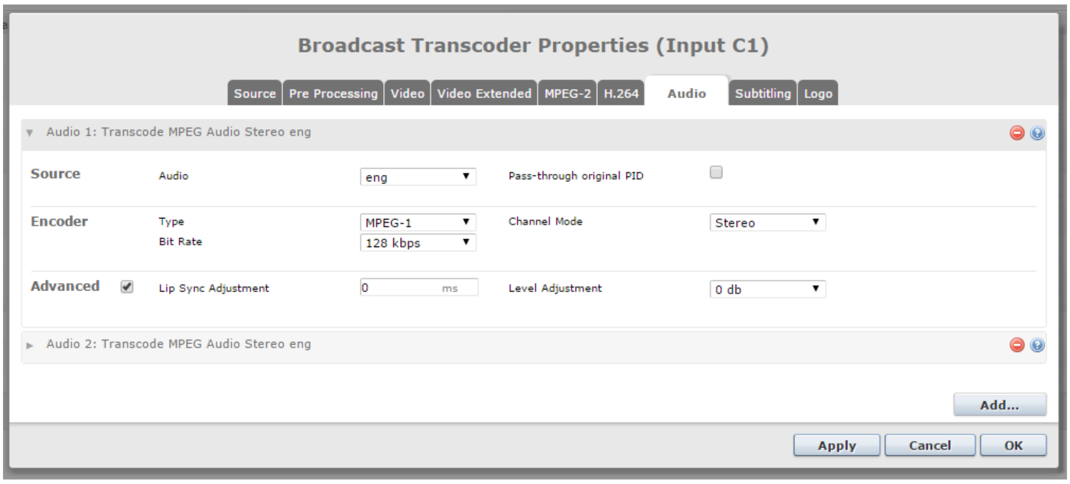
Dolby Digital or Dolby Digital Plus components can also be set to pass-through.

9.3.7.3 Audio Parameter Configuration

The audio transcoders are shared between the channels of the board. The user can allocate different numbers of transcoders per channel as long as the maximum number is not exceeded.

An audio transcoder is added by clicking on the 'Create' button on the bottom of the Audio page. An audio Transcoder is removed by clicking on the red '-' button to the right of the Transcoder. When a Transcoder is removed from one channel, it can be used on another channel.

The following parameters are available for Audio configuration:



Source

Audio	Audio input selection. This pull-down will display a list of available languages as well as 'Select Any Language' and advanced selection options (ie component type, language, PID)
Pass-through original PID	If selected, the original audio component is also passed to the output service along with the transcoded audio component.

Encoder

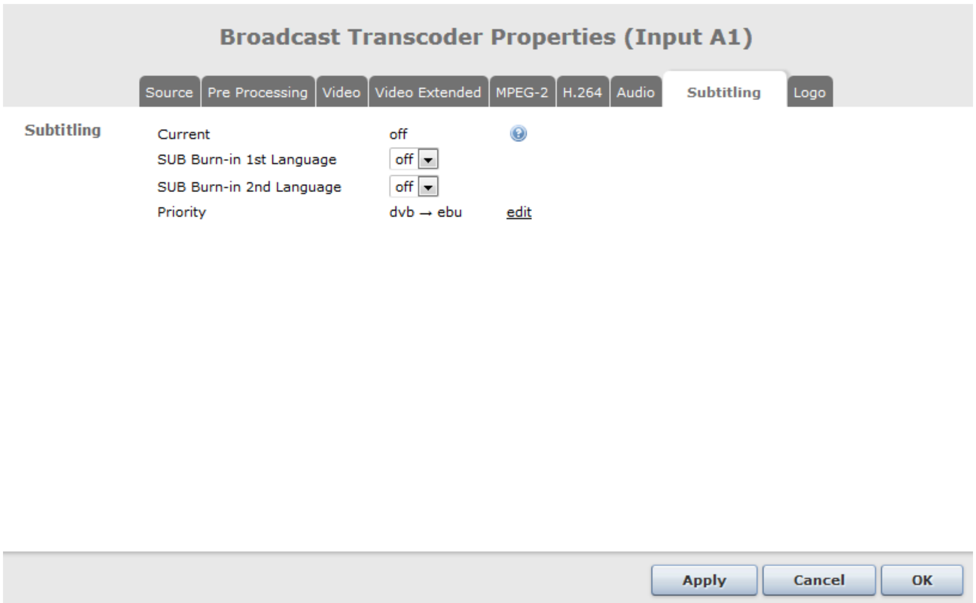
Type	MPEG-1 , AAC, HE-AACv1, HE-AACv2
Channel Mode	Output channel format. Available choices depend on selected Source Mode and Encoder Type • Stereo • Mono • Dual Mono
Bitrate	Bitrate of compressed audio, available choices depend on Encoder Type and Mode.
Container	ADTS or LATM (Encoder Type AAC, HE-AACv1 and HE-AACv2 only)

Advanced

Lip Sync Adjustment	-200ms to +500ms adjustment to the lip sync
Level Adjustment	+20 to -20 dB adjustment to the input level

9.3.8 Subtitling Parameters

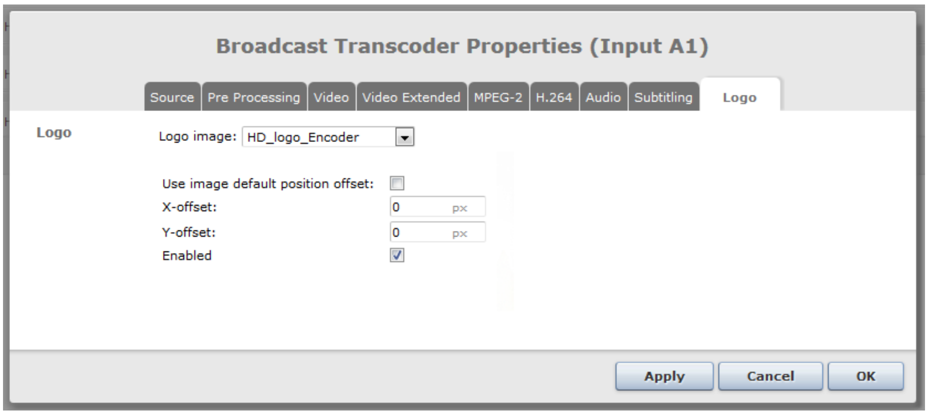
The user can adjust the subtitle language priority on type basis. If a service contains both DVB subtitling and EBU subtitling on same language, the transcoder will select subtitling source based on the type priority configured.



Sub Burn-in 1st Language	Specify the 1st Language for Sub Burn in from drop down list.
Sub Burn-in 2nd Language	Specify the 2nd Language for Sub Burn in from drop down list.
Priority	Specify the Subtitling Selection Priority.

9.3.9 Logo Insertion

Once there is a valid logo on the MMI (section 0), then it is possible to assign this to a transcoder channel. This is configured on the Logo tab:



Once the correct logo resolution is chosen for the service and the offset set, the logo can then be enabled.

9.4 Statistical Multiplexing

The principle of statistical multiplexing is that a group of video encoders/transcoders (referred to as a StatMux group) shares a fixed quantity of TS bandwidth. The bandwidth is distributed by a centralized StatMux controller, and the program with the most complex video may be allowed to use more bandwidth than programs with less complex video or with a lower priority.

The statistical probability that all programs in a multiplex shall demand a high bit rate at the exact same time decreases when the size of the multiplex group increases.

The motivation for a Statmux system is to either:

- Avoid spending bandwidth on simple video sequences in order to free up capacity for new programs in the multiplex.
- Distribute available multiplex bandwidth between programs in order to increase overall video quality (VQ), by minimizing overall quantization (QP)

9.4.1 Module and Statmux Engine Support

In the Appear TV system there are two Statistical Mulitplex engines (Normal and Universal) and depending on the modules installed in the unit, only one of these is activated at a time.

The following encoder/transcoder modules types are supported in the Normal Statmux Engine :

- EC-100, EC-200 and TC-100

The following encoder/transcoder modules types are supported in the Universal Statmux Engine :

- EC-400, TC-200 and TC-400

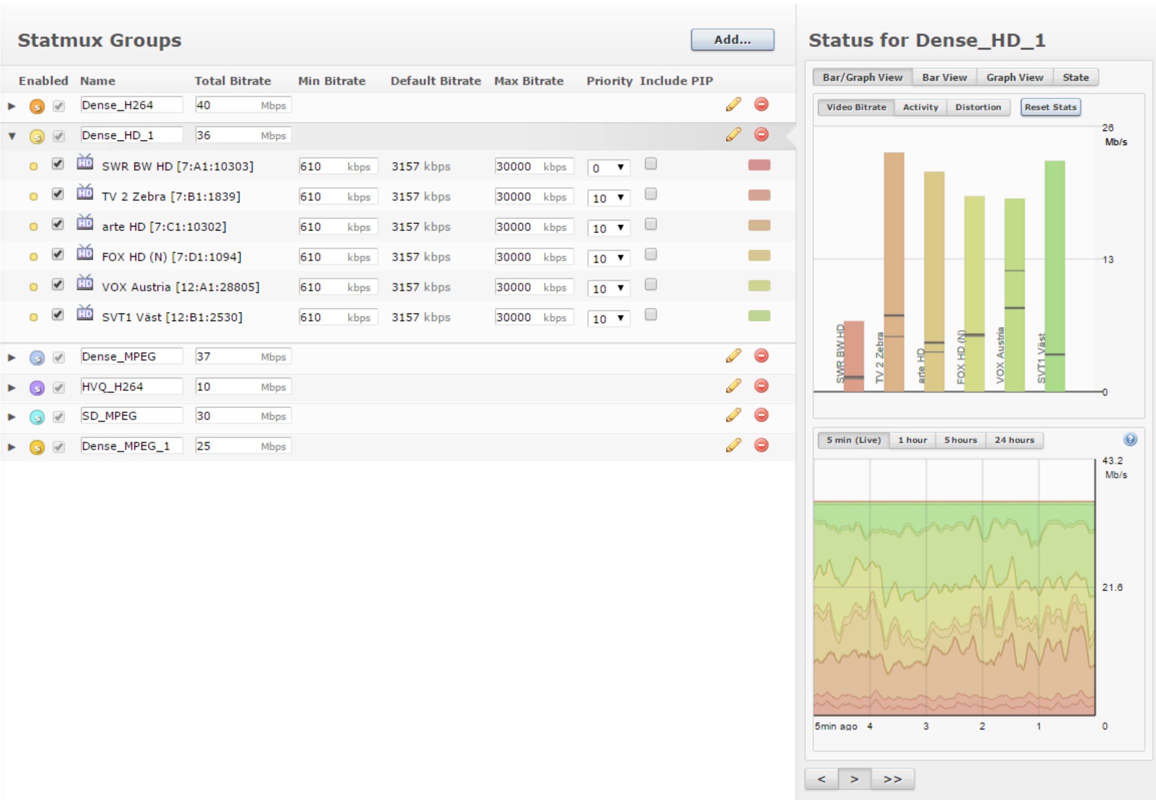
In a unit, it is not possible to activate both Statmux engines and it is not possible to combine Normal and Universal modules if Statmux is to be enabled in the unit.

	Please note the following limitations on the Universal Statmux Engine: • It is not possible to combine different codecs in the same Statmux group, eg

	MPEG2 and H.264 • It is not possible to combine High VQ channels with Dense Broadcast channels in the same Statmux group

9.4.2 Statmux Group Configuration

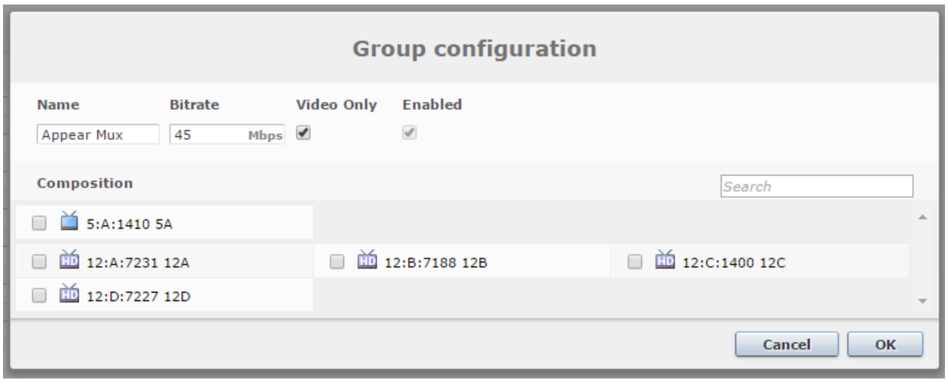
The Statmux tab is available under the top level Coders menu in the Navigation Pane. Clicking the Statmux tab will bring up the Statmux GUI page. This is where the Statmux groups are generated. On this page, the Statmux groups are listed, status displayed and able to be modified.



9.4.3 Adding and editing a Statmux Group

The 'Add...' Statmux Group button will pop up a dialog and allow you to create a new Statmux group, allocate bitrate and assign services. A maximum of 48 programs may be added into Statmux groups.

i	For services from the TC-100 transcoder module, you will have to configure these on the output before they are able to be added to a Statmux group.



The following parameters are available:

Name	User generated name that identifies the Statmux group in the GUI.
Bitrate	Total bitrate (Mbps) that will be shared between all coders in this Statmux group.
Video Only	When enabled, the bitrate of the statmux will be measured by the Video PID ES rate. When this is disabled, the bitrate allocation will take into account other PIDs according to the table:

Module	PSI (PAT/PMT/etc)	Video	Audio	VBI/VANC	Passthrough
Encoder	No	Yes	Yes	Yes	Yes (AC-3)
Transcoder	No	Yes	Yes	Yes	Yes

Enable	Enable the Statmux Group
Composition	This lists the services available to be added, or services that are a part of the Statmux Group. To add/remove a service, the checkbox of the service can be used.

To edit an existing Statmux group, click on the next to the group. The above dialog will then be presented.

i	When AC-3 passthrough audio is enabled, a fixed bitrate of 640kbps is reserved inside the group

i	Transcoder pass-through PID's are shown under the transcoder properties dialog by clicking any transcoder under the Coders tab

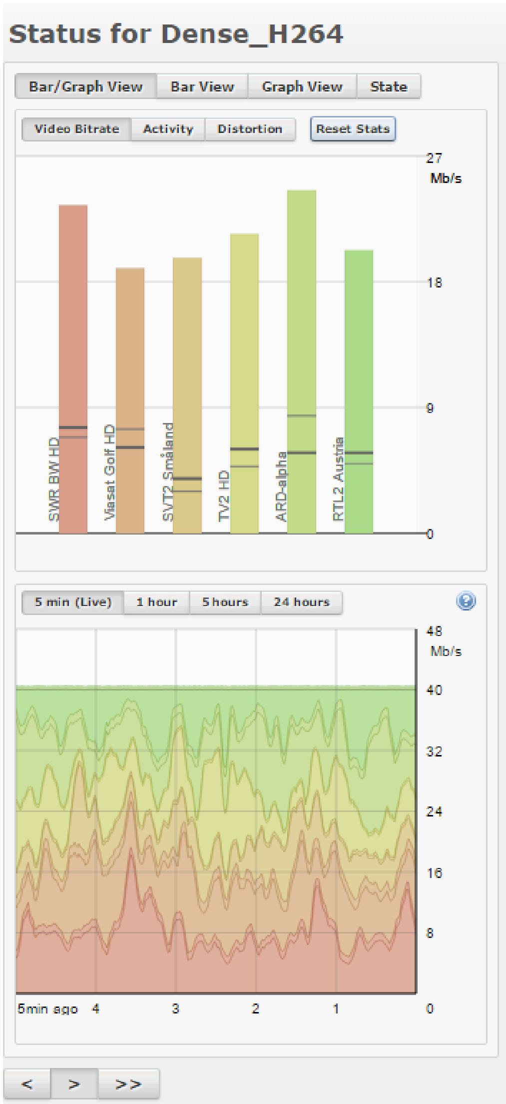
9.4.3.1 StatMux Group Status

Selecting a Statmux group will display its status in the right-hand tab on the page. The following status is available:

Video Bitrate	Bitrate allocated by the video PID in this program.

Activity	Informal measurement of frame-to-frame video activity and estimated bitrate requirements for this program. A low activity indicates a still picture while a high activity indicates rapid scene changes. A HD channel will have a higher video activity (and higher bitrate requirements) than a SD channel..
Distortion	Informal measurement of video distortion after encoding based on the amount of quantization introduced per video frame. A low distortion value indicates that a low QP and a high VQ was achieved

The statistics can be reset using the 'Reset Stats' button

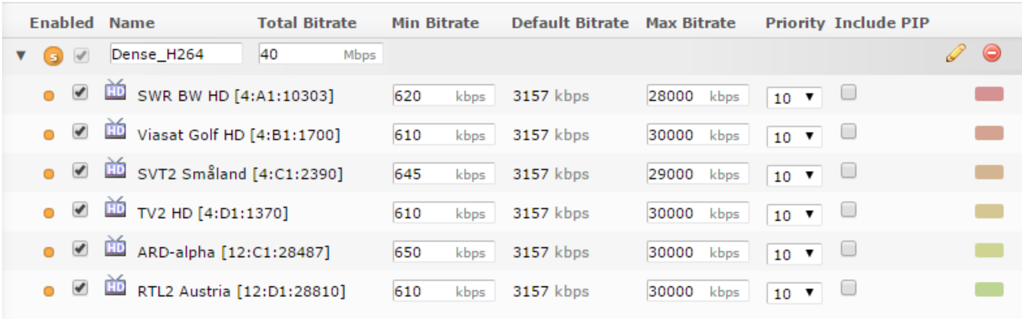


For each bar, the following information is shown:

- Maximum bitrate since last reset
- Current live bitrate
- Average bitrate since last reset
- Minimum bitrate since last reset

9.4.4 StatMux Service Configuration

When a Statmux group has been expanded, you can edit any program inline:



The following service related parameters are available under the Settings tab:

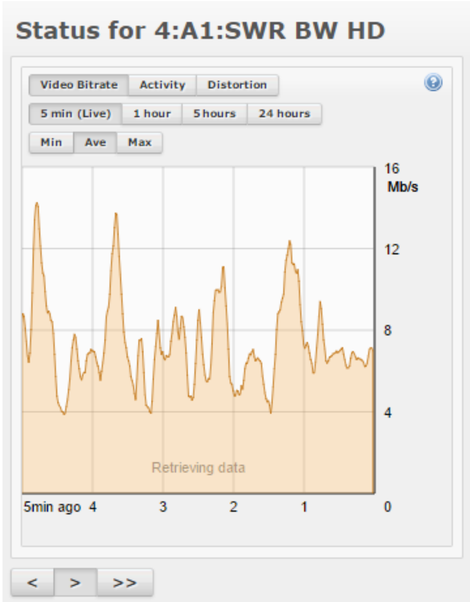
Minimum Bitrate	This is the minimum allowed bitrate allocated by this program.
Default Bitrate	This is the bitrate used when there contact is lost with the Statmux controller, eg in a Redundancy Switching scenario.
Maximum Bitrate	This is the maximum allowed bitrate allocated by this program.
Priority	The priority will adjust the video priority of this channel in the range [-5,-4,-3,-2,-1-,Normal,+1,+2,+3,+4,+5]. A higher priority will increase the allocated video bitrate and video quality of this program compared to other programs in the StatMux group. The priority parameter will directly affect the amount of quantization (QP) allowed for this program, in QP steps.

9.4.4.1 StatMux Service Status

Clicking on a specific service in the Statmux will bring up the program status with history view up to 24 hours. The following status is available per program:

- *Video Bitrate*: Bitrate allocated by the video PID in this program.
- *Activity*: Informal measurement of frame-to-frame video activity and estimated bitrate requirements for this program. A low activity indicates a still picture while a high activity indicates rapid scene changes. A HD channel will have a higher video activity (and higher bitrate requirements) than a SD channel.
- *Distortion*: Informal measurement of video distortion after encoding, based on the amount of quantization introduced per video frame. A low distortion value indicates that a low QP and a high VQ was achieved.

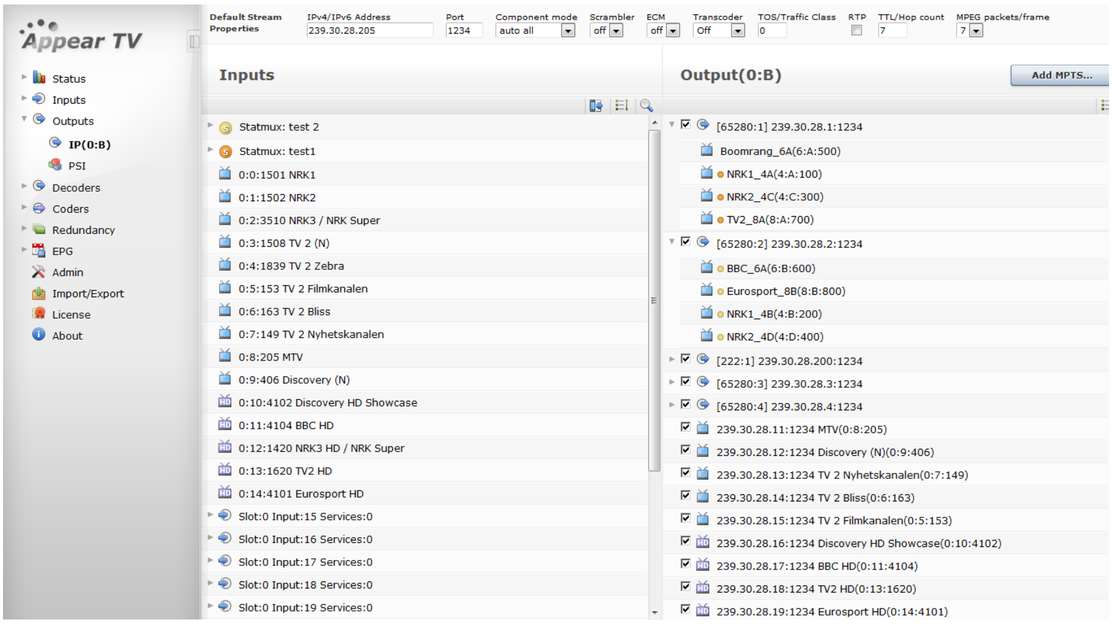
Four different time scales are available: 5 min (Live), 1 hour, 5 hours and 24 hours.



9.4.5 Statmux Service Output Configuration

Programs that are part of a Statmux group are treated as any other program in the output multiplexer. Any output can contain a combination of non-Statmux and Statmux channels from different Statmux groups.

Statmux programs are grouped under the input column, and colour markers are used to mark Statmux group membership.



i	Removing a service from a Statmux group will also remove this service from the output

9.5 Logo Insertion

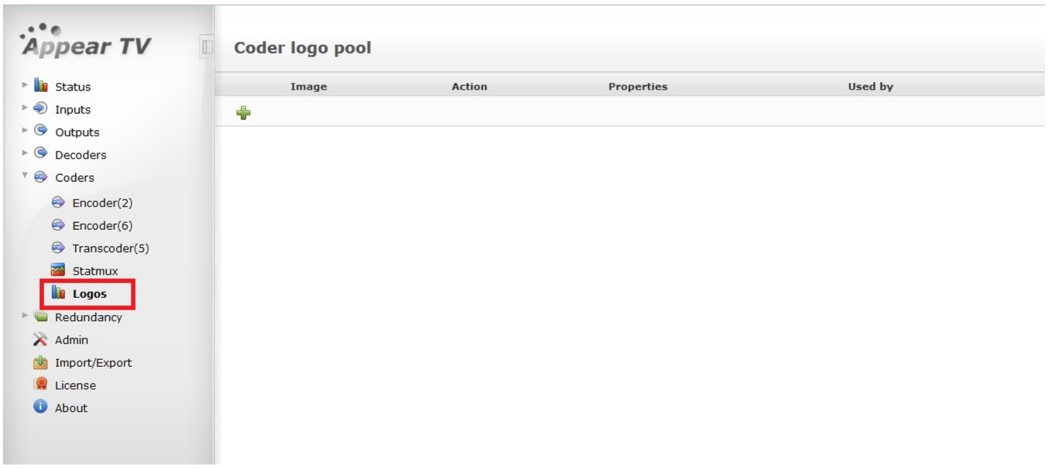
In order to add logo images to an encoded/transcoded service, an image of the corresponding resolution will first need to be uploaded to the MMI mode.

	A **MicroSD card** has to be available on the MMI module. All logos are stored on the MMI module. Please contact support@appeartv.com for details.

9.5.1 Uploading Logo to the MMI

The file format supported by the Logo Insertion is 8-bit PNG with correct resolution (listed below). If the PNG file is in ARGB format, the logo will be transparent depending on the alpha channel in the PNG file.

In order to upload the file, first navigate to the **Coders->Logos** page:



Note: If no micro SD card is present on the MMI, the following message will appear.

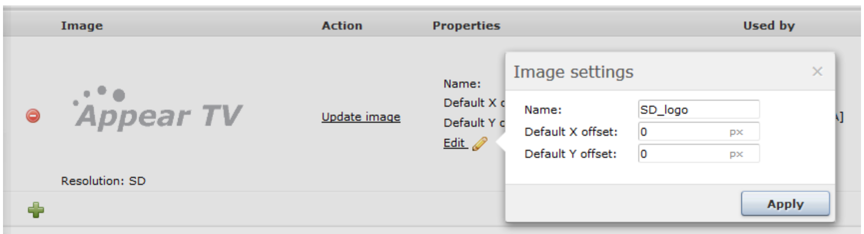
"No microSD card inserted into card reader. Please contact support."

The next step is to click the ➕ and navigate to the PNG file with appropriate resolution. Once uploaded, this will create a new entry in the logo table.

Required size depends on resolution of encoder SD/720P/1080i.

Encoder->Edit->Source->Video Format	Logo Resolution
576i/480i	192x128
720p	360x180
1080i	480x270

Once uploaded, it is possible to edit the information/details of the logo.



For each downloaded logo the user can define a default position. The position defined with pixel accuracy. X (horizontal) and Y (vertical) defines position of **top left corner** (**TLC**) of logo in active video.

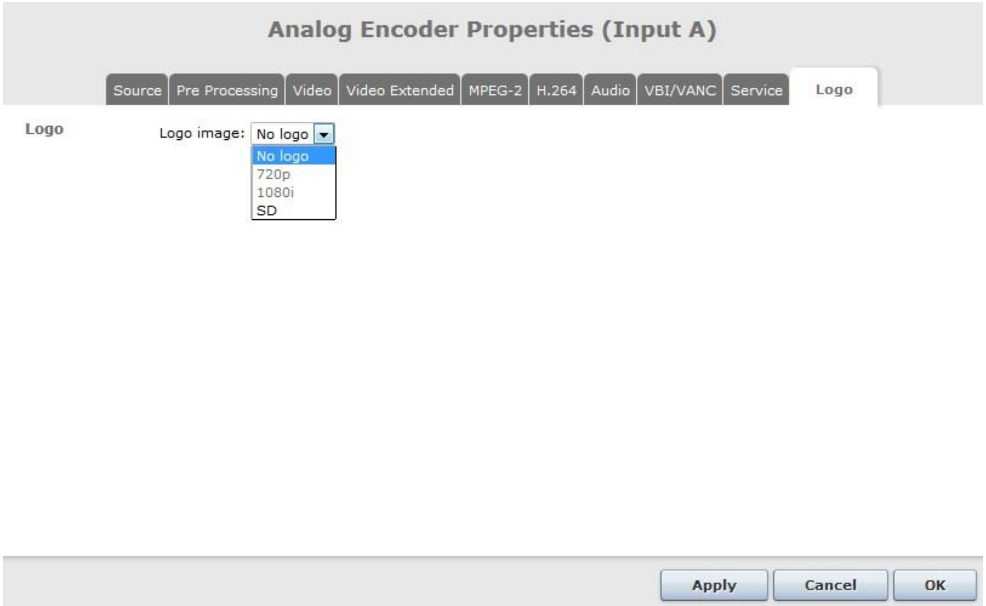
- Example 1: Position (X=0, Y=0) positions logo's TLC in TLC of active video.

- Example 2: Position (X=200, Y=100) positions logo's TLC 200 pixels from LHS, and 100 pixels down from first line of active video.

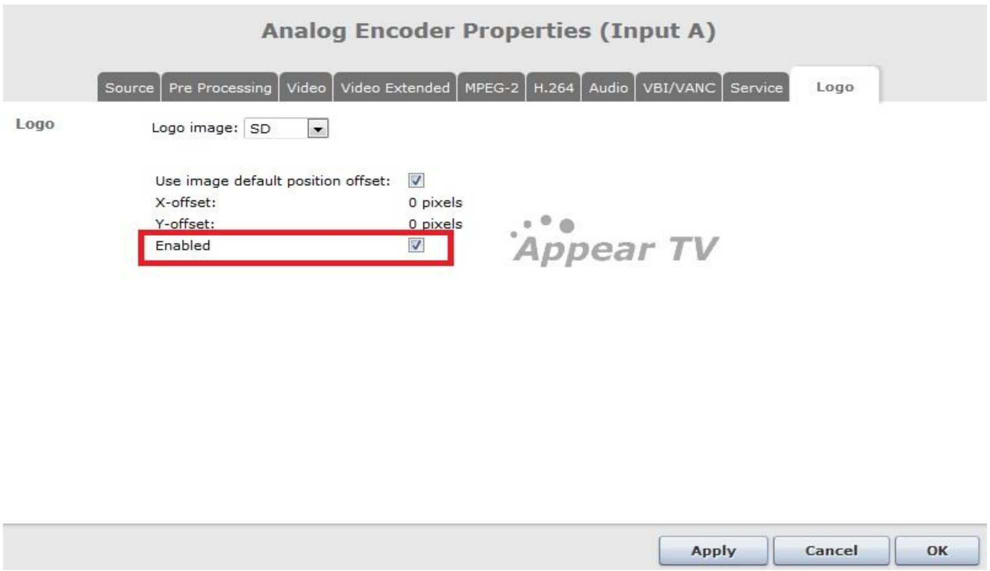
The logo can be updated at any time by clocking on the 'Update image' text.

9.5.2 Configuring Logo Insertion

Once there is a valid logo on the MMI (section 0), then it is possible to assign this to an Encoder, Transcoder or MS Transcoder channel. This is configured on the **Logo** tab in the properties:



You will first need to select the chosen resolution, then enable the required logo:

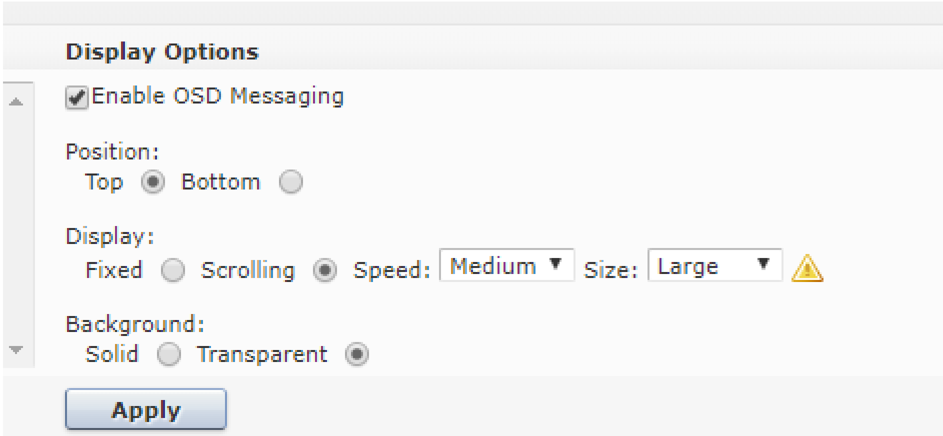


9.6 OSDM (On Screen Display Message) Support

On the EC-400, TC-200 and TC-400 modules, it is possible to enable an OSDM (On Screen Display Message) on the output service.

Once a text string and its options have been configured on the **OSDM** page in the GUI (see section 7.5), then it can be assigned to an encoder/transcoder service from the 'Available' pool of services.

Font size of OSDM can also be adjusted as per options available in drop down list.



9.7 Audio Processor Module

The Audio Processor module (AP-100) allows both the encoding of SDI Embedded and AES67 audio along with audio transcoding from any input module.

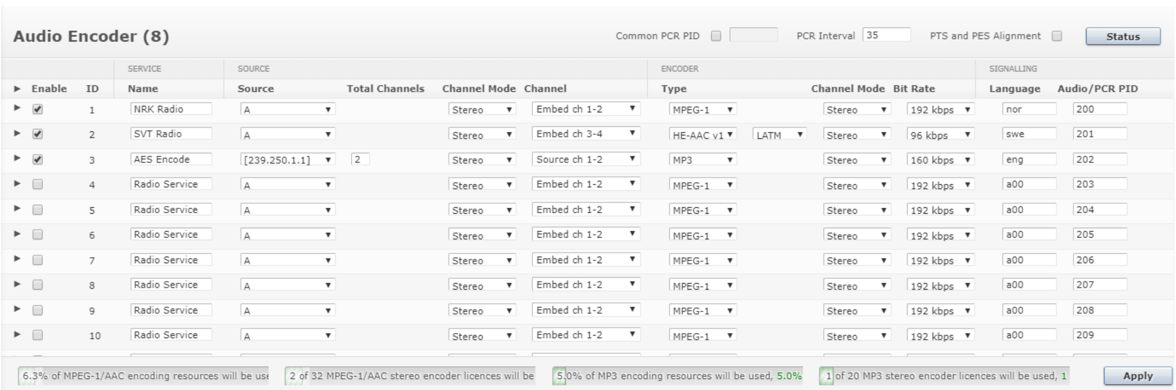
The following codecs and bitrates are supported

	Bitrate minimum/maximum (at 48 kHz)			
	Mono	Stereo	5.1	7.1
MPEG-1 Layer 2	32 / 192	64 / 384	N/A	N/A
MPEG-1 Layer 3 (MP3)	32 / 320	32 / 320	N/A	N/A
AAC-LC	32 / 192	64 / 384	192 / 640	N/A
HE-AAC v1	32 / 96	48 / 192	112 / 512	N/A
HE-AAC v2	N/A	24 / 96	N/A	N/A
Dolby® Digital*	56 / 640	96 / 640	224 / 640	N/A
Dolby® Digital Plus*	32 / 1024	96 / 1024	192 / 1024	348 / 1024

* Available in Transcoder Mode only

9.7.1 Audio Encoder Mode

In Audio Transcoding mode the module is capable of encoding up to 32 services from either SDI or AES67 (IP) input. Each of the 32 inputs are pre-defined and can be enabled individually.



When configuring AES67 input, you must first define the input multicast on the 'Input->Data Sources' page in the GUI.

PTS and PES Alignment	Enable or Disable PTS and PES Alignment.

Source

Name	Name of the encoded service

Source

Source	Select from either SDI port (A, B, C or D) or AES67 input multicast.
Total Channels	Available for AES67. Specify number of input channels.
Channel Mode	Input channel format. • Stereo • Mono
Channel	For SDI Channels, select the source of the audio pair.

Encoder

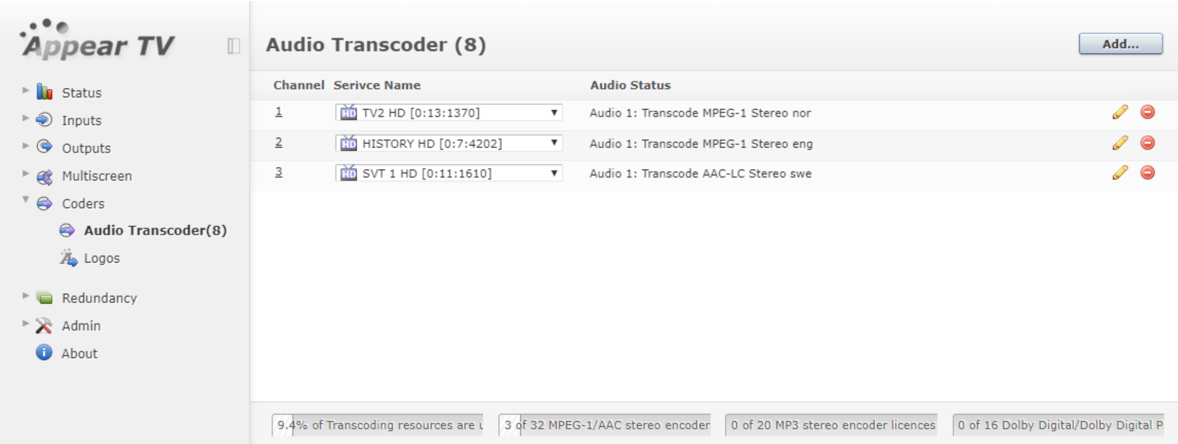
Type	MPEG-1 , AAC, HE-AACv1, HE-AACv2, MP3
Container	ADTS or LATM (Encoder Type AAC, HE-AACv1 and HE-AACv2 only)
Channel Mode	Output channel format. • Stereo • Mono
Bitrate	Bitrate of compressed audio, available choices depend on Encoder Type and Mode.

Signalling

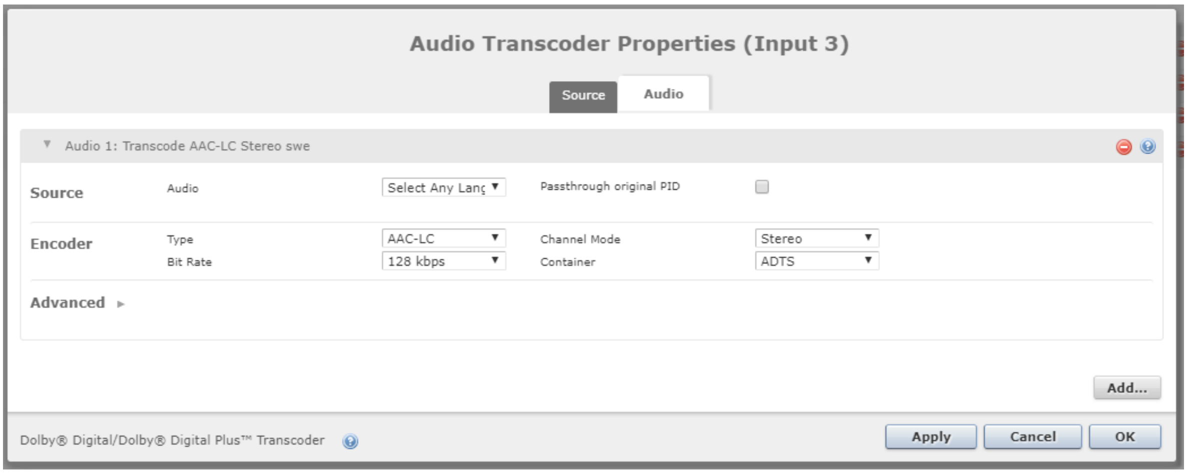
Language	Language of the output service to be signaled
Audio / PCR PID	Audio PID for the encoded audio output.

9.7.2 Audio Transcoder Mode

In Audio Transcoding mode the module is capable of transcoding audio of up to 32 services. New services can be added by clicking on the 'Add' button.



The input service can be selected from the pull-down box for each service. To edit service transcoding parameters, click on the icon. This will display the following dialog box:



To add a transcoder option, click the 'Add' button and select the language (if needed). Multiple transcoding can be added per service.

Source

Audio	Audio input selection. This pull-down will display a list of available languages as well as 'Select Any Language' and advanced selection options (ie component type, language, PID)
Pass-through original PID	If selected, the original audio component is also passed to the output service along with the transcoded audio component.

Encoder

Type	MPEG-1 (0x03), MPEG-1 (0x04) , AAC-LC, HE-AACv1, HE-AACv2, Dolby® Digital, Dolby® Digital Plus, MP3
Channel Mode	Output channel format. Available choices depend on selected Source Mode and Encoder Type • Stereo • Mono • 3/2 + LFE (5.1)

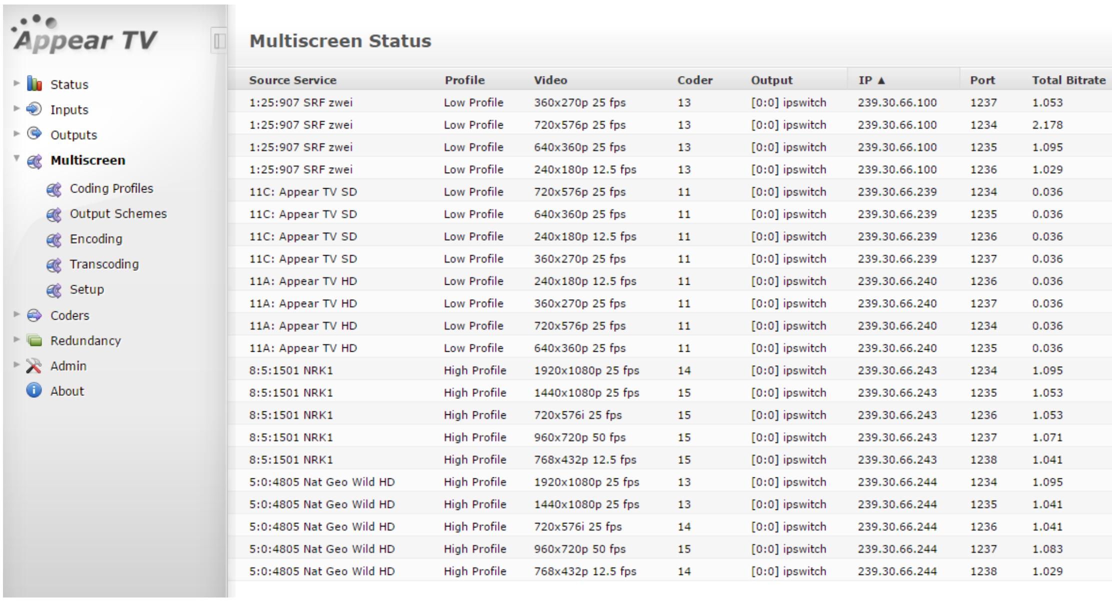
	• ¾ + LFE (7.1)
Bitrate	Bitrate of compressed audio, available choices depend on Encoder Type and Mode.
Container	ADTS or LATM (Encoder Type AAC-LC, HE-AACv1 and HE-AACv2 only)

Advanced

Lip Sync Adjustment	-200ms to +500ms adjustment to the lip sync
Level Adjustment	+20 to -20 dB adjustment to the input level

9.8 Multiscreen Resource Allocator

Configuration of Multiscreen services are done using the Resource Allocator GUI which is found under the **Multiscreen** page in the Navigation Pane:



Source Service	Profile	Video	Coder	Output	IP ▲	Port	Total Bitrate
1:25:907 SRF zwei	Low Profile	360x270p 25 fps	13	[0:0] ipswitch	239.30.66.100	1237	1.053
1:25:907 SRF zwei	Low Profile	720x576p 25 fps	13	[0:0] ipswitch	239.30.66.100	1234	2.178
1:25:907 SRF zwei	Low Profile	640x360p 25 fps	13	[0:0] ipswitch	239.30.66.100	1235	1.095
1:25:907 SRF zwei	Low Profile	240x180p 12.5 fps	13	[0:0] ipswitch	239.30.66.100	1236	1.029
11C: Appear TV SD	Low Profile	720x576p 25 fps	11	[0:0] ipswitch	239.30.66.239	1234	0.036
11C: Appear TV SD	Low Profile	640x360p 25 fps	11	[0:0] ipswitch	239.30.66.239	1235	0.036
11C: Appear TV SD	Low Profile	240x180p 12.5 fps	11	[0:0] ipswitch	239.30.66.239	1236	0.036
11C: Appear TV SD	Low Profile	360x270p 25 fps	11	[0:0] ipswitch	239.30.66.239	1237	0.036
11A: Appear TV HD	Low Profile	240x180p 12.5 fps	11	[0:0] ipswitch	239.30.66.240	1236	0.036
11A: Appear TV HD	Low Profile	360x270p 25 fps	11	[0:0] ipswitch	239.30.66.240	1237	0.036
11A: Appear TV HD	Low Profile	720x576p 25 fps	11	[0:0] ipswitch	239.30.66.240	1234	0.036
11A: Appear TV HD	Low Profile	640x360p 25 fps	11	[0:0] ipswitch	239.30.66.240	1235	0.036
8:5:1501 NRK1	High Profile	1920x1080p 25 fps	14	[0:0] ipswitch	239.30.66.243	1234	1.095
8:5:1501 NRK1	High Profile	1440x1080p 25 fps	15	[0:0] ipswitch	239.30.66.243	1235	1.053
8:5:1501 NRK1	High Profile	720x576i 25 fps	15	[0:0] ipswitch	239.30.66.243	1236	1.053
8:5:1501 NRK1	High Profile	960x720p 50 fps	15	[0:0] ipswitch	239.30.66.243	1237	1.071
8:5:1501 NRK1	High Profile	768x432p 12.5 fps	15	[0:0] ipswitch	239.30.66.243	1238	1.041
5:0:4805 Nat Geo Wild HD	High Profile	1920x1080p 25 fps	13	[0:0] ipswitch	239.30.66.244	1234	1.095
5:0:4805 Nat Geo Wild HD	High Profile	1440x1080p 25 fps	13	[0:0] ipswitch	239.30.66.244	1235	1.041
5:0:4805 Nat Geo Wild HD	High Profile	720x576i 25 fps	14	[0:0] ipswitch	239.30.66.244	1236	1.041
5:0:4805 Nat Geo Wild HD	High Profile	960x720p 50 fps	15	[0:0] ipswitch	239.30.66.244	1237	1.083
5:0:4805 Nat Geo Wild HD	High Profile	768x432p 12.5 fps	14	[0:0] ipswitch	239.30.66.244	1238	1.029

The following parameters are available for Multiscreen status page:

Source Service	Specify the source of service where it is input from.
Profile	Specify the name of the profile
Video	Specify Video format
Coder	Specify the coder slot
Output	Specify the output source card where it is streamed
IP	Specify the IP address of the service
Port	Specify the port number of the service
Total Bitrate	Specify the total bitrate used for that service

When beginning configuration of the Multiscreen modules, the following steps are recommended:

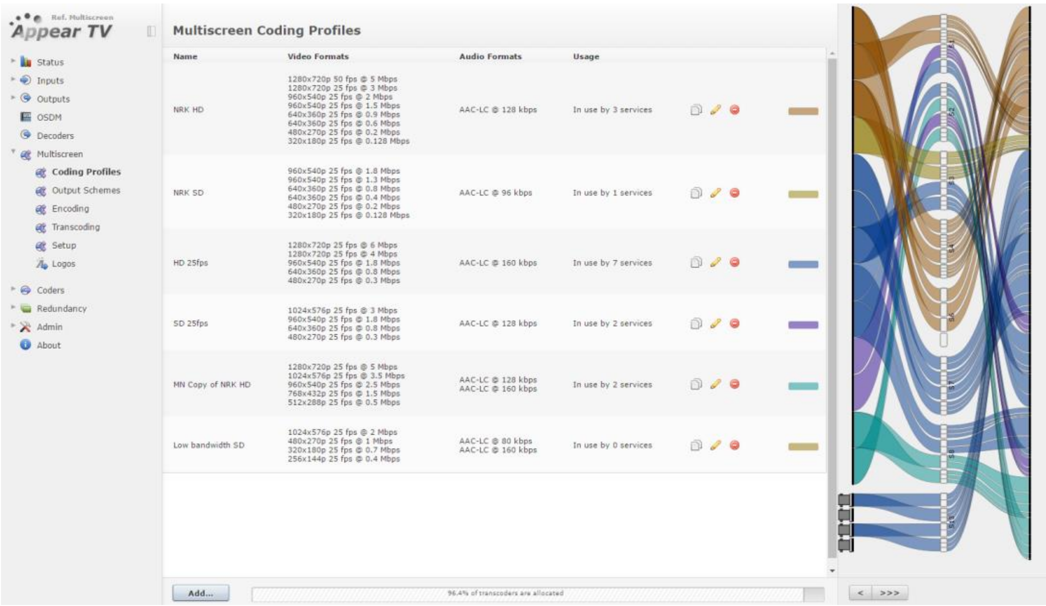
- Configure Coding Profiles for the desired output resolutions, screens and audio components
- Configure Output Schemes required for multicast output
- Configure Encoder / Transcoder services and assign these to a Coding Profile and Output Scheme

9.8.1 Coding Profile

9.8.1.1 Overview

A Coding Profile defines a set of desired video and audio formats that can be allocated to an encoded/transcoded service for output. It is possible to define as many coding profiles as required. A Coding Profile can be used to code any number of services on both encoding and transcoding applications.

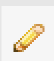
This page will display the overall configuration of the Coding Profiles:

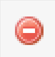


The following parameters are available for Multiscreen Coding Profiles:

Name	Name of the Profile can be specified.
Video Formats	List of desired video formats
Audio Formats	List of desired Audio formats
Usage	By default, the configuration system will auto generate a service line up based on the audio and video formats configuration

The following operations are available by clicking on the icon associated with the service:

	Copy the profile
	Edit the profile

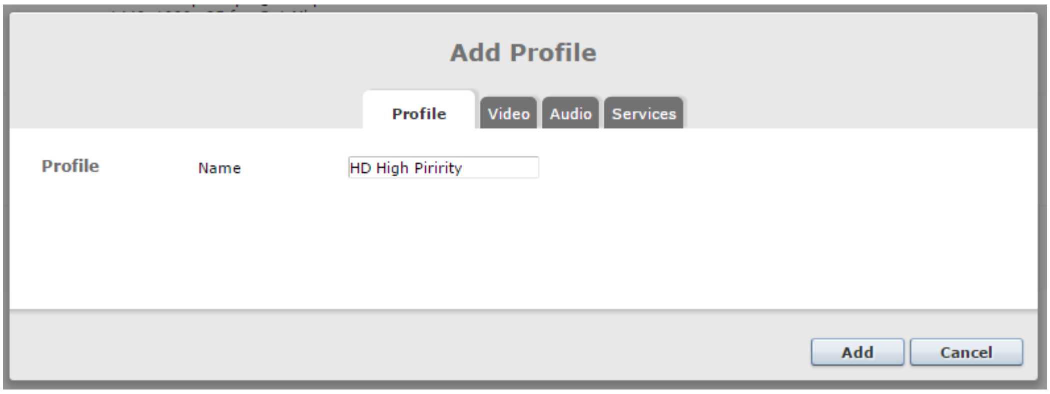
	Delete the profile. Please note that this will not allow you to delete profiles that are in use.

In addition, the total allocation status is show on this page:

This status will be updated dynamically when services are added or removed.

9.8.1.2 Configuration

In order to create a Coding Profile, navigate to the 'Coding Profiles' page and you will be presented with a list of the current profiles. To add a new profile, click the 'Add' button and you will be provided with the following dialog:

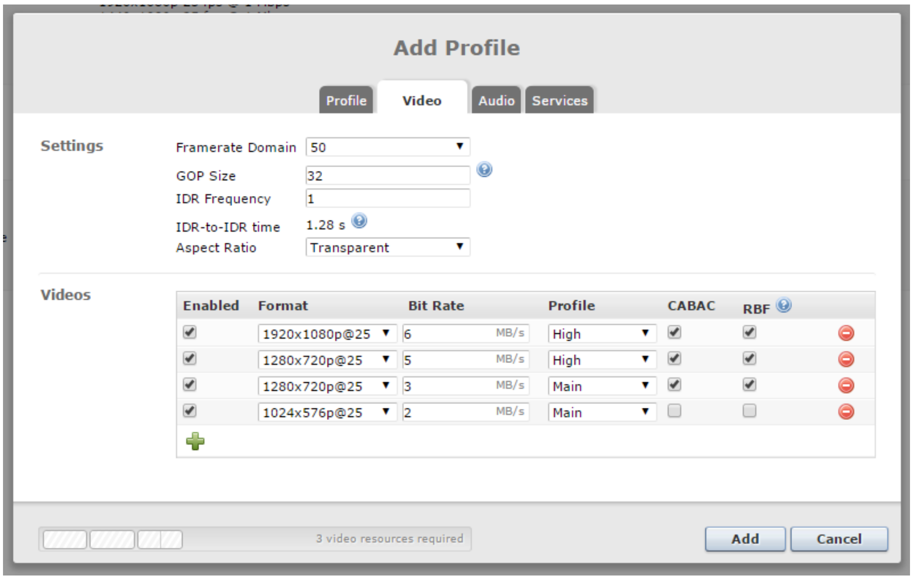


Here the following parameters can be configured:

Profile

Name	Name of the Profile

Video

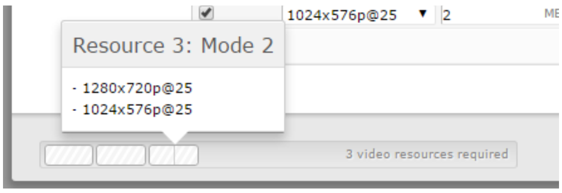


Framerate Domain	Expected input framerate domain.
GOP size	Controls the GOP length.
IDR Frequency	Sets how often I frame should be upgraded to IDR frames.
IDR to IDR Time	Status field presenting the distance in time between IDR frames; calculated on the basis of configured GOP size and IDR frequency.
Aspect Ratio	Defines aspect ratio. If input AR differs from the output AR, pillar boxing or letterboxing will be applied.

In the videos section the required video formats is defined. It is possible to define up to 10 individual video formats. To add a new video format, click on the button, and to remove click the button. For each required video format the following parameters are available for configuration:

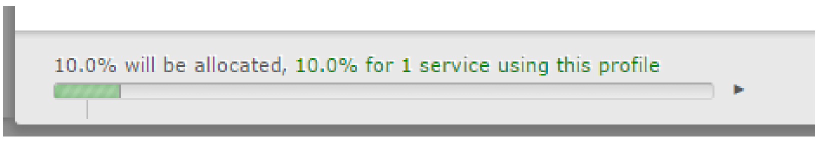
Enabled	Enable or disable each video format individually. This means that enabling or disabling individual video formats might cause a reconfiguration of all services which is coded with the current coding profile.
Format	Select resolution and frame rate of each video format instance
Bit Rate	Configure bit rate for each screen. Valid bit rate range depends on resolution.
Profile	Configure H264 Profile (encoding complexity) for the respective screen. The choices are Main Profile (MP), Constrained Baseline Profile (CBP) and High Profile (HP). The H264 Level is calculated based on bitrate, resolution and frame rate.
CABAC	Enable or disable CABAC entropy coding.
RBF	Enable or disable hierarchical B frames.

Listed at the bottom of this tab the Multiscreen resources required for the defined videos in the profile are displayed:



Each Multiscreen module contains 4 video recourses and this overview shows the number of required and by hovering over each block, which videos are allocated to the resource.

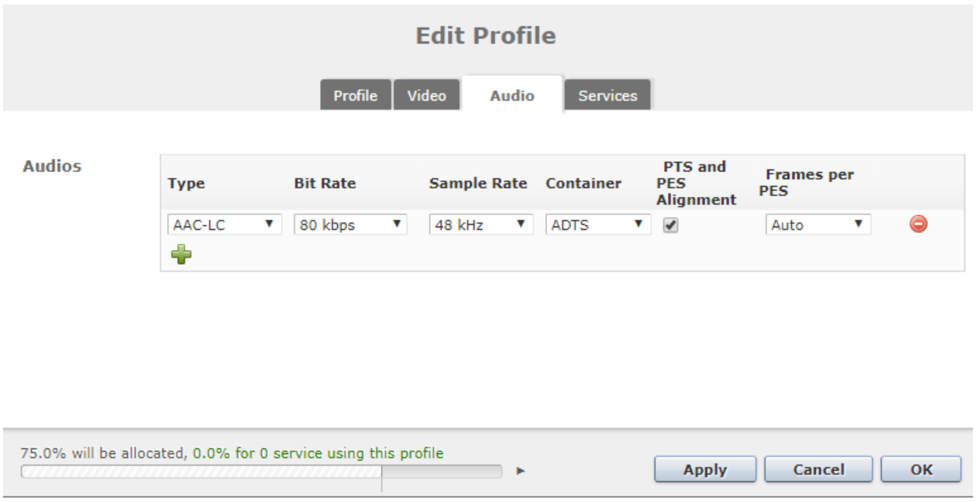
Once services have been allocated to the profile, you will be presented with an overview of total resources used by this profile



In order to switch to the resource usage view, click on the button.

Audio

The required audio formats are defined here. The number of audio formats is limited by the number of video formats defined; it cannot exceed the number of video formats defined in the profile. To add a new audio format, click on the button, and to remove click the button. For each audio format the following parameters are available:



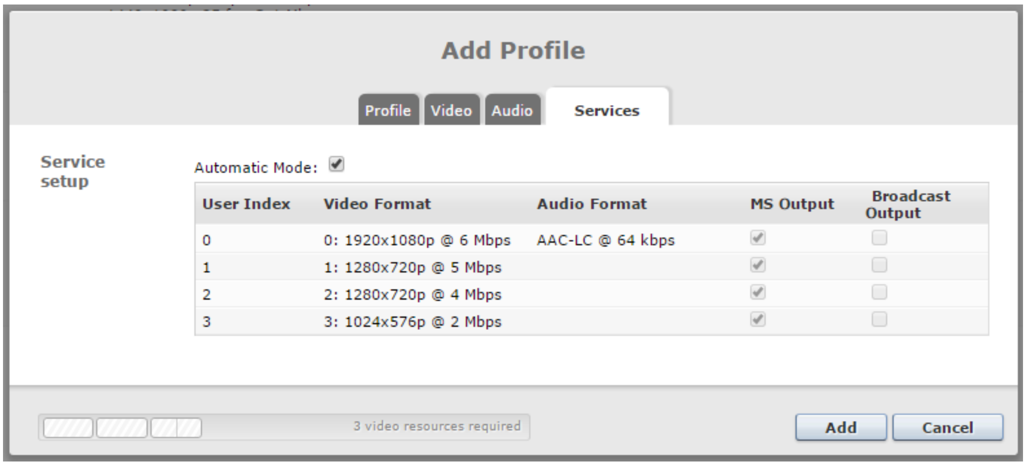
The following parameters are available for Audio section:

Codec	The output codec type. MPEG-1, AAC-LC, HE-AACv1 and HE-AACv2 are supported.
Bitrate	The output bitrate. Valid range depends on the selected codec type.
Sample Rate	The sample rate of the output. The audio is sample rate converted.
Container	AAC container. LATM and ADTS are supported.
PTS and PES Alignment	Enable or Disable PTS and PES Alignment.
Frames per PES	Specify frame per PES from the drop–down list

	Support for 6 audio tracks per video block.

Services

The coded video formats and audio formats are transported as services in MPEG-2 Transport streams (See output section). One SPTS will be created per video format and the individual audio formats needs to be assigned to a service to be part of the generated output transport streams. The audio formats can be auto-assigned to the services, or manually assigned by the user.



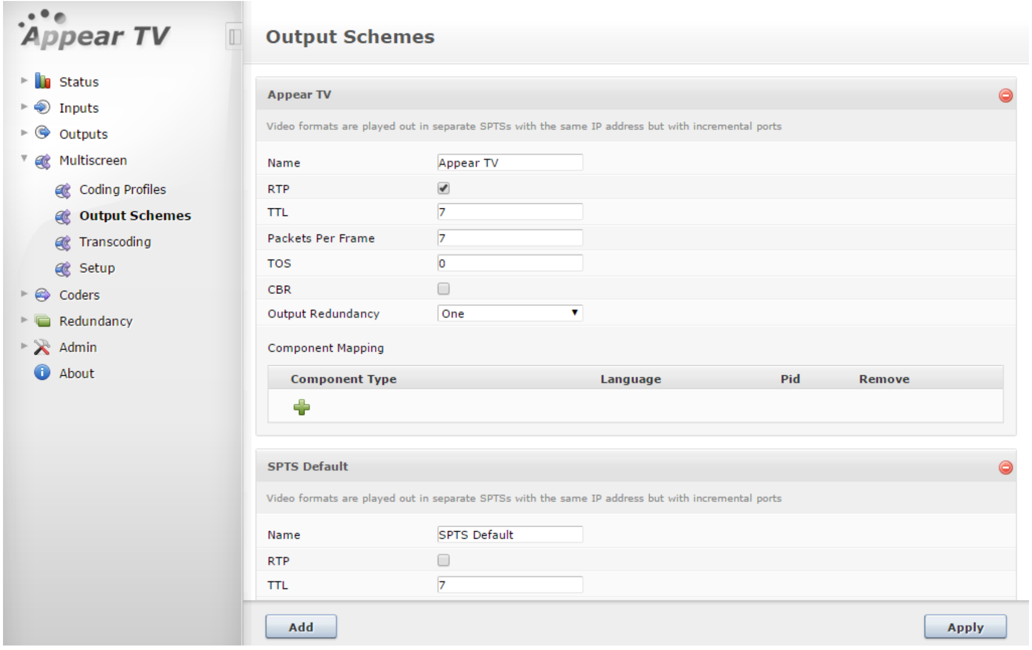
The following parameters are available for Service setup section:

Automatic Mode	Enable/Disable Automatic Mode
User Index	This parameter controls the UDP port offset of the transport stream containing the output service.
Video Format	Displays the Video Format
Audio Format	Specifies the Audio Format peer output
MS output	Enables MS output Services. When selected, this video/audio will have an SPTS created automatically on the output
Broadcast Output	When enabled, this allows the specific video/audio to be selected and routed to an output module as a standard output service.

9.8.2 Output Scheme

Coding a service with a particular coding profile will generate multiple video and audio components, carrying the same content, but in different formats. The configuration system will automatically generate the necessary output MPEG TS to be able to transport all the generated components. Currently only SPTSs will be supported, where the system generates one SPTS per video component.

The settings for these generated transport streams are defined in re-usable output profiles (currently names output schemes).

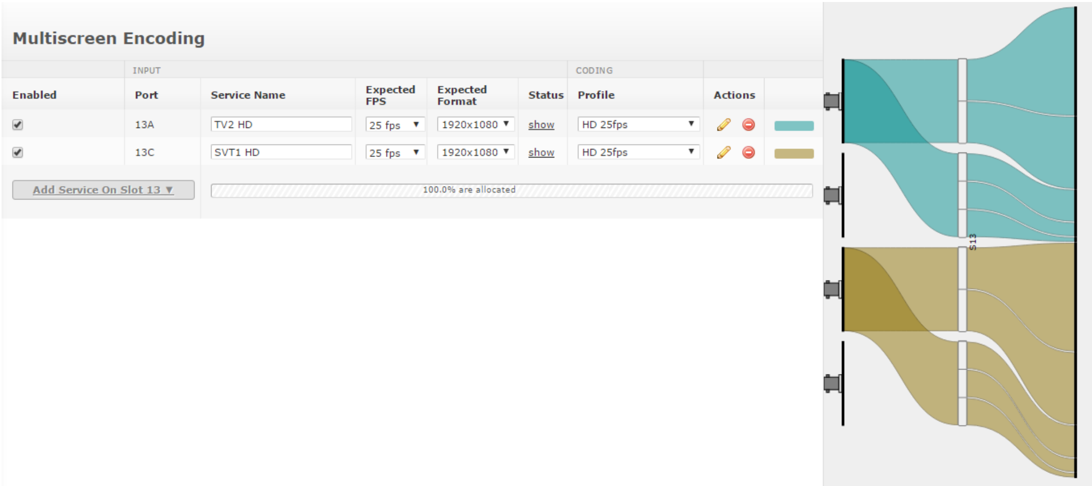


The following parameters are available for Output Schemes section:

Name	Specifies the Name of Output Profile
RTP	Enables RTP for the output stream
TTL	Specifies Time to Live
Packets Per Frame	Specifies Packets Per Frame
TOS	Species Type of Services
CBR	Enables CBR for the output stream
Output Redundancy	Below options can be selected for Output Redundancy from drop down list • OFF • One • Majority • All
Component Mapping	Here it is possible to define component mapping rules for the generated output PIDs. It is possible to create as many rules as required.

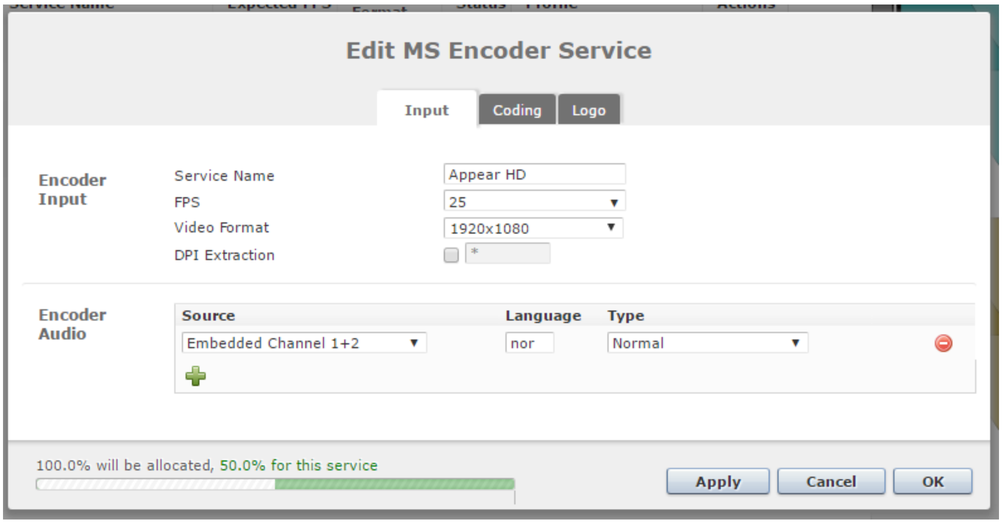
9.8.3 Encoding

Navigating to the 'Encoding' page under the 'Multiscreen' tree will present you with an overview of the encoder modules and services as well as the total current allocation of the resources:



Here you see an overview of the resources allocated per module and the option to edit and remove the parameters per channel.

As Encoder Multiscreen is locked to a physical input port, it is only possible to allocate a service to one module in which the SDI is connected. In order to configure a port, click on the 'Add Service on Slot XX' button that corresponds to where the SDI signal is connected. You will then be presented with the following dialog:



The following parameters are available for Edit MS Encoder Service -Input section:

Encoder Input

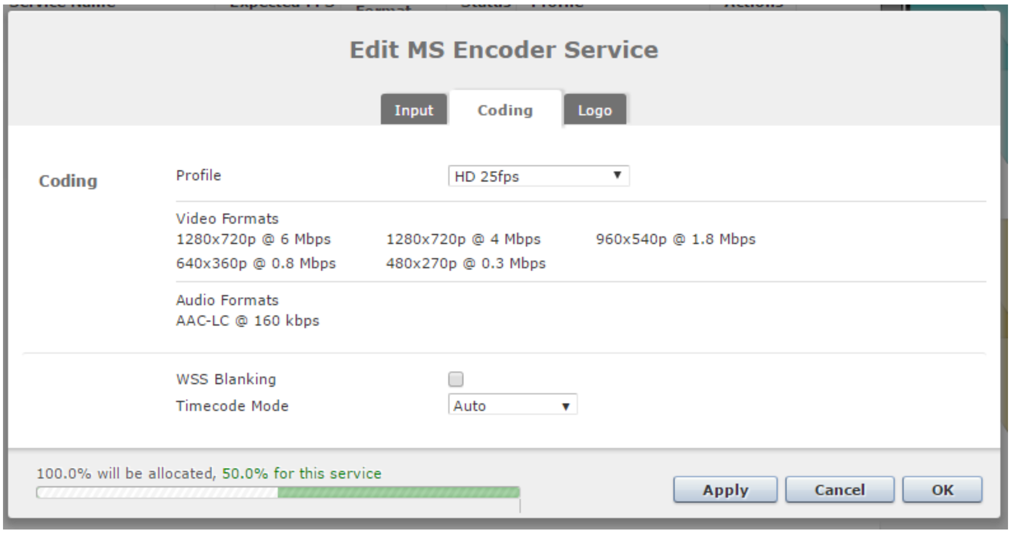
Name	Specifies the Service Name.
FPS	Specify Frame Rate form the drop down list
Video Format	Specify the Video Format from the drop down list

Encoder Audio

Source	Specify the Audio Source from the list
Language	Specify the Audio Language

Type	Specify the Audio Type from the drop down list (Normal / Clean Effects / Hearing Impared / VI Commentary)

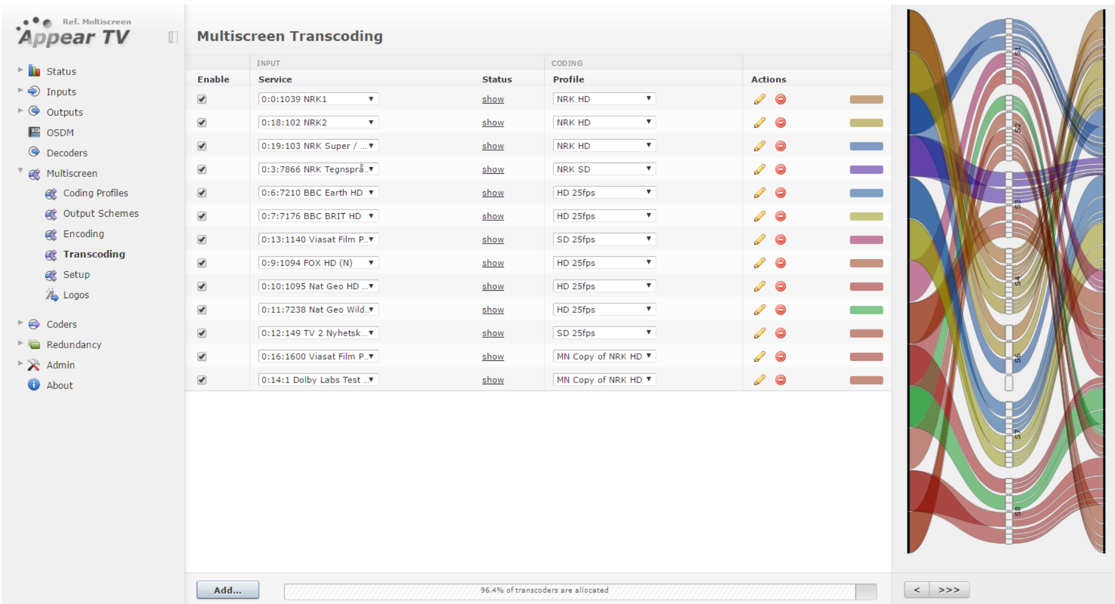
The following parameters are available for Edit MS Encoder Service –Coding section:



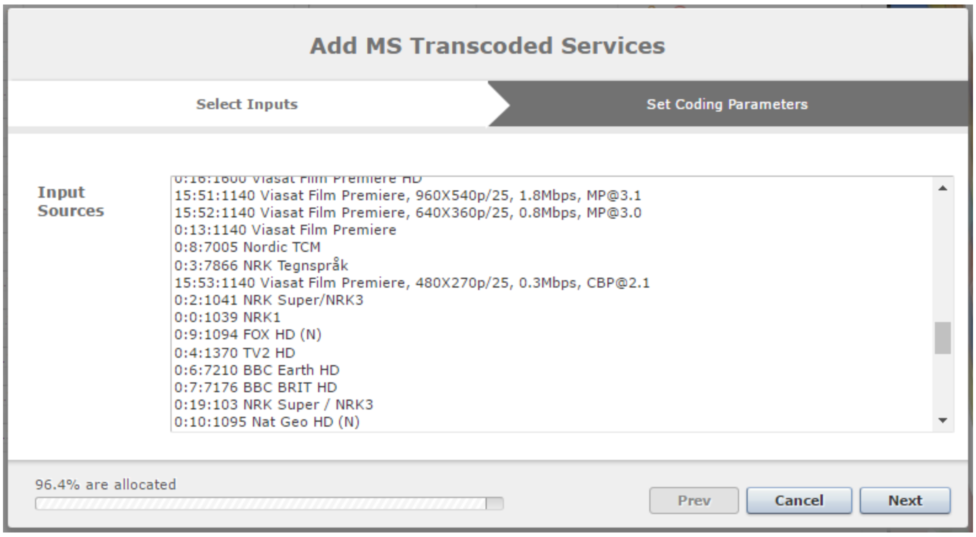
Profile	Select from the drop down list of profiles available.
Video Formats	List of Video format defined by the profile
Audio Formats	List of Audio format defined bythe profile

9.8.4 Transcoding

Navigating to the 'Transcoding' page under the 'Multiscreen' tree will present you with an overview of the transcoded services as well as the total current allocation of the resources:

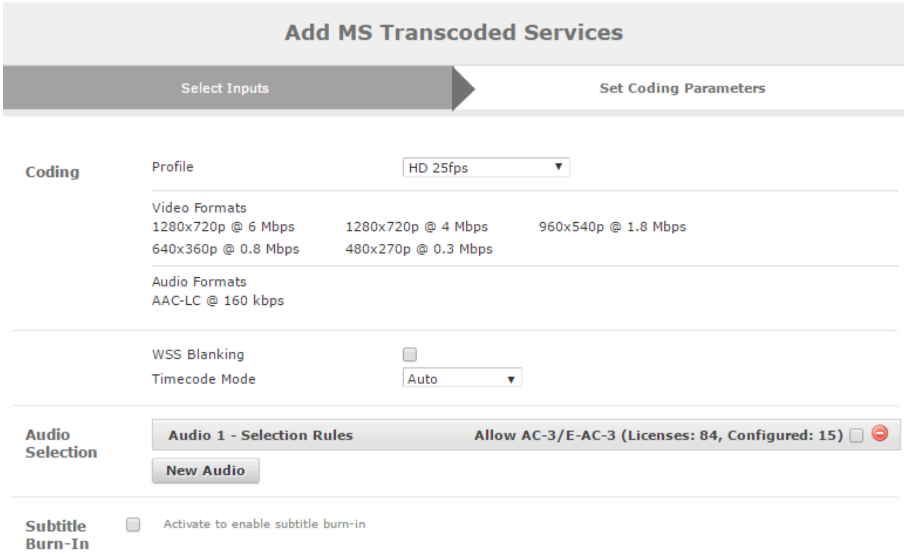


Clicking on the **'Add'** button opens a configuration wizard for setting up Transcoding of a new service. The first step is to select the service required from a list of all valid input services:



Select any of the services from the **Input source** and Press **Next** button.

The second step is to select which coding profile to use for coding.



The following parameters are available for the **Coding Parameters**:

Coding

Profile	Select from the drop down list of profiles available.
Video Formats	List of Video format already defined by this profile
Audio Formats	List of Audio format already defined by this profile
WSS Blanking	Enable WSS (line 17) blanking on the transcoded service

Audio Selection

By default there is an 'Audio 1' that is created and this will pass through the first audio component. It is possible to expand this and specify filtering rules.

Pressing 'New Audio' will allow you to create more audios.

Priority	Specify the audio Priority
Source Type	Specify the source from the drop down list
Source Language	Specify audio language
Source PID	Specify the Audio Source PID

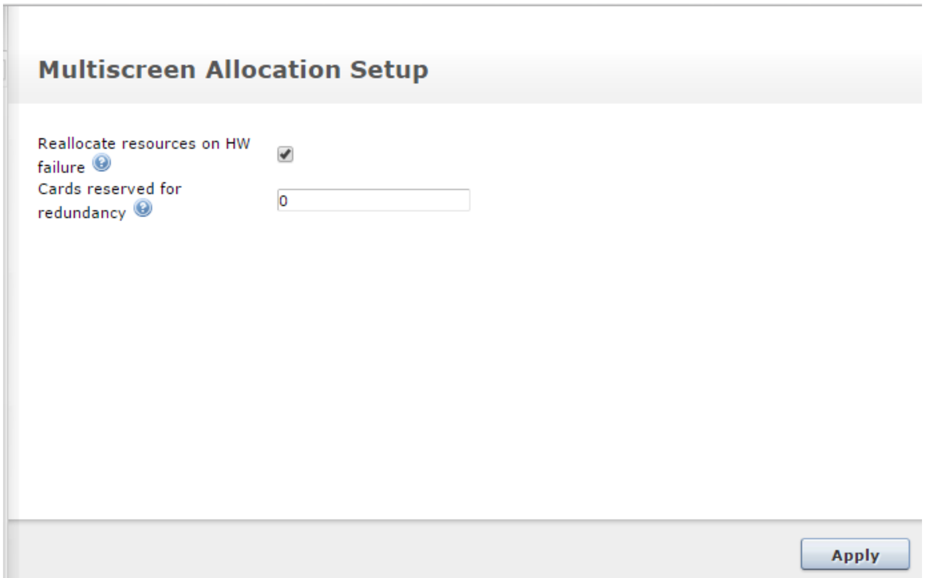
Subtitle Burn-In

If the checkbox is enabled, you can define one or more languages of subtitles to parse and a priority in which they can be assigned to the transcoder.

Language (1)	Specify the Language for subtitle burn-in
Language 2	Specify the Language2 for subtitle burn-in
Priority	Set the priority of which subtitle type should be used: DVB / EBU / DVB Hearing Impaired / EBU Hearing Impaired

9.8.5 Multiscreen Setup

The 'Setup' page is available to configure the redundancy settings for the Multiscreen module allocation.



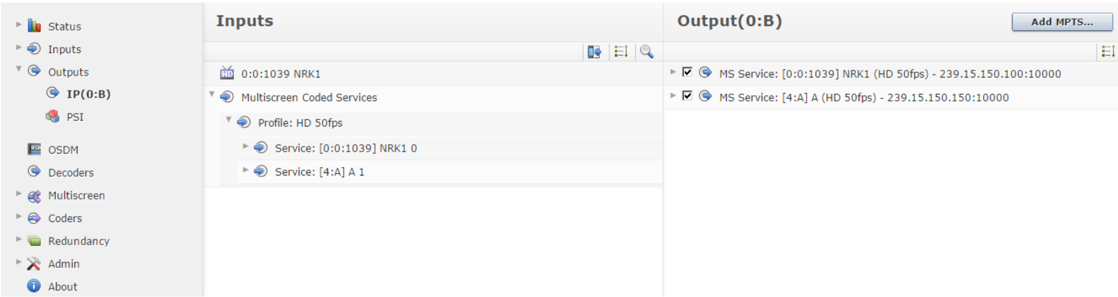
The following parameters are available for Multiscreen Allocation Setup page:

Reallocation resource HW failure	Enable check box option for reallocation resource HW failure. The list of available alarm triggers is displayed on the **Redundancy->Triggers** page

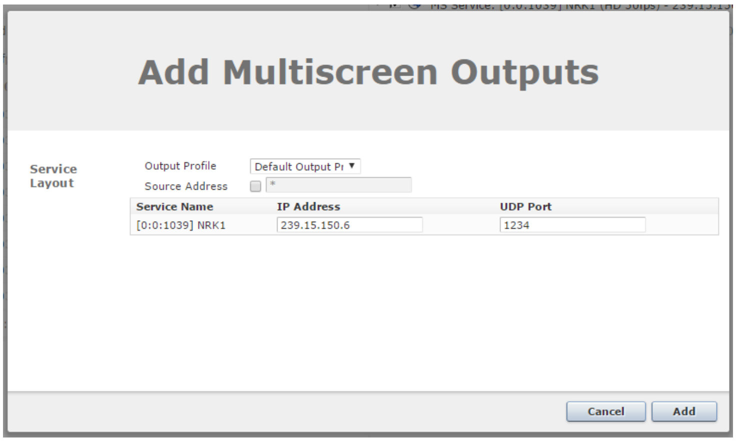
Card reserved for redundancy	Allocate a number of modules to be reserved for redundancy switching. These modules will be removed from the allocation pool and no services assigned.

9.8.6 Creating Multiscreen Output Services

To create output multiscreen services, navigate to the 'Outputs' page of the required output module. On the left hand 'Inputs' panel, find the 'Multiscreen Coded Services' top-level option and this will expand to display first the 'Coding Profiles' in use, then each service using this profile.



To create a unified output of each service, you can drag-drop the top-level service to the right-hand Output panel. This will bring up a dialog box which allows you to set the Output Profile and IP Address/Port.



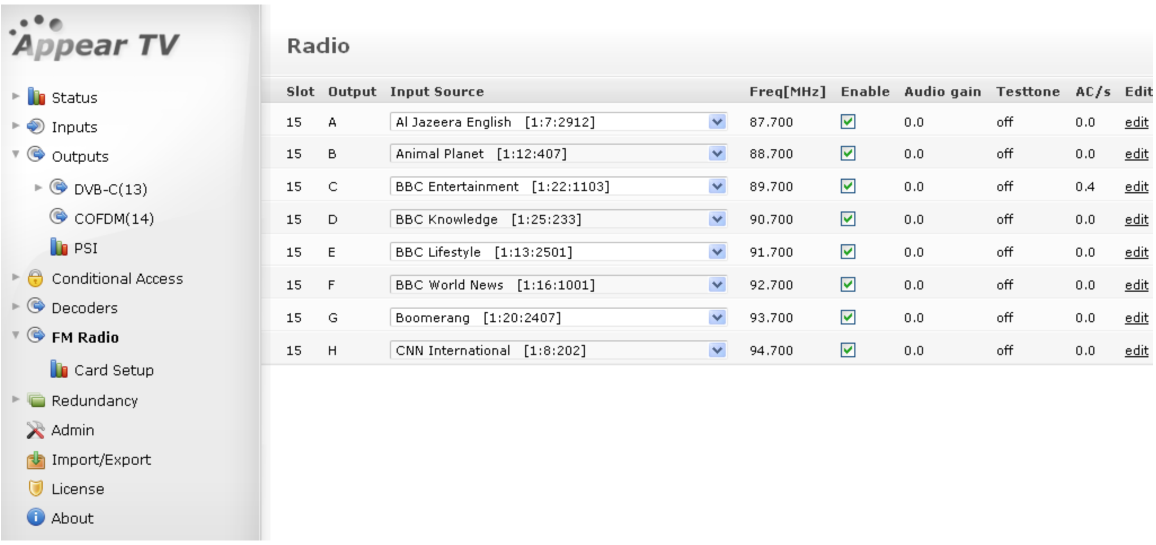
Once this is added, the multicast will be activated and shown on the Output panel.

10 Audio Output Configuration

10.1 FM Radio Output Configuration

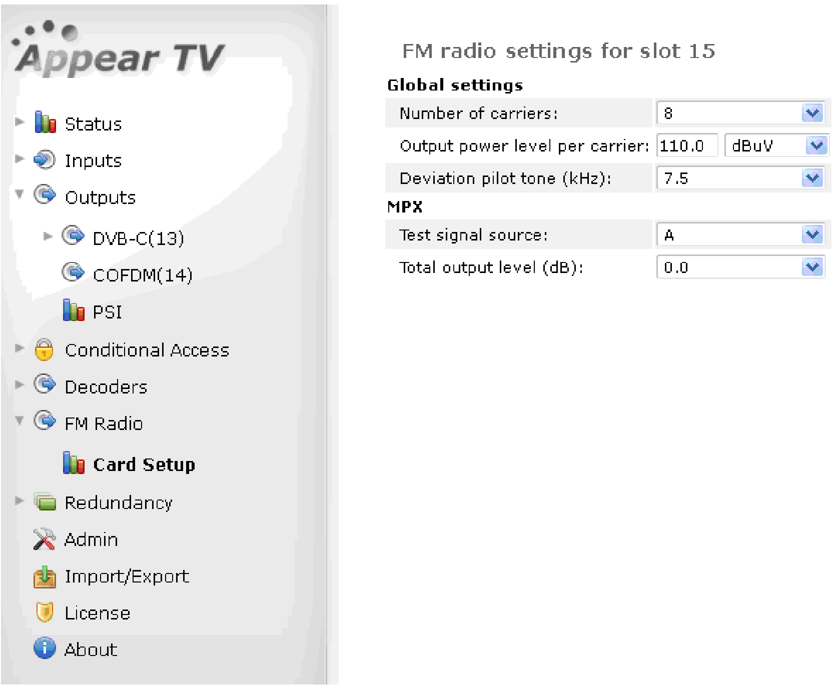
The Web GUI allows for configuration of both the overall module (number of carriers to be output by the module, power level, deviation pilot tone, etc.) as well as specific service configuration (selection of services, frequency, RDS, etc.).

For quick installations, the default module configuration can be used, allowing the operator to skip straight to service configuration.



10.1.1 Configuring Global Parameters for a Module

To configure global module parameters, from the **Navigation Pane** select **FM Radio → Card Setup**. Click **Edit** for the module you would like to configure. The FM radio settings page below will be displayed:



The FM Radio settings interface displays the following values under the **Global settings** section:

Number of carriers	Choose either: 1, 2, 4, or 8 carriers.
Output power level per carrier	Default value is 107.0 dBµV and the accepted range is between 95 – 111dBµV. This value, however, can be expressed in dBµV, dBmV, or dBm.
Deviation pilot tone (kHz)	Represents the amplitude of stereo pilot signal. Its range is between 1.0 kHz to 12.0 kHz with a default value of 7.5 kHz.

Under the **MPX** section, the following parameters are available:

Test signal source	The port number of the test signal source; default is A.
Total output level (dB)	Valid adjustment is from 6.0 dB to -6.0 dB, with a default value of 0.0 dB.

To ensure that the total power level is appropriate, any changes in the number of carriers need to be followed by a power level reset.

The number of services is determined in the global parameters setup. If the module is not configured, only eight services along with default frequencies will be listed.

10.1.2 Configuring Radio Services

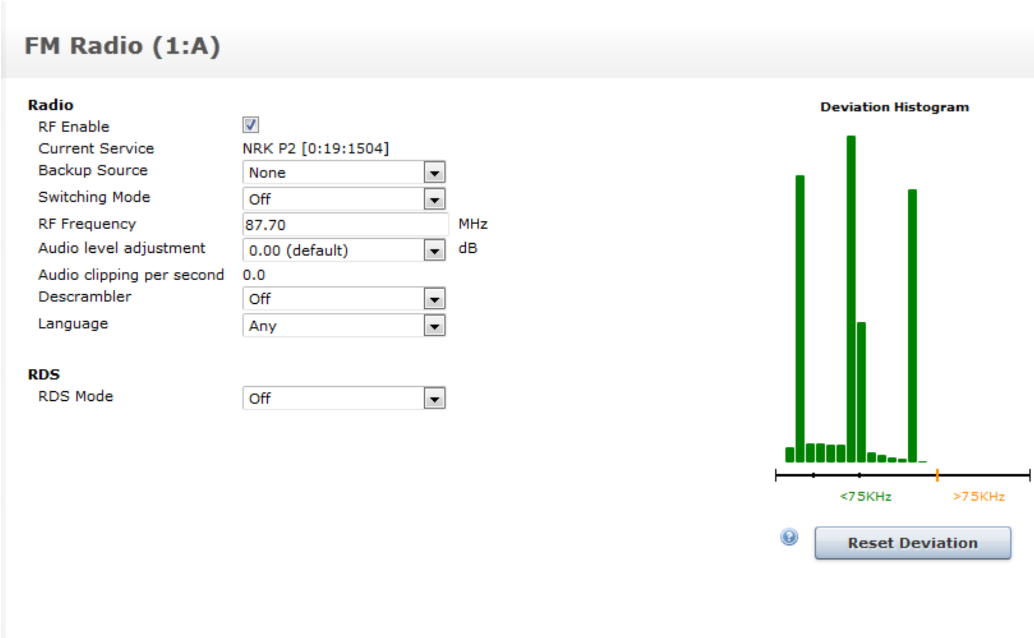
To configure services on the FM radio module, select **FM Radio** from the **Navigation Pane**. A list of all FM radio modules in the chassis is shown, by slot number, together with a list of services with configurable fields for each service on the module.

The following variables are displayed:

Slot	The slot in which the module is installed
Output	The port on which the service is output
Input Source	Select a service of your choice via the drop down box
Freq [MHz]	Output frequency of the service
Enable	Enable RF up-conversion of a chosen service from a particular port on a module in a particular slot.
Audio gain	Relative audio output level in dB; audio output level can be adjusted by clicking **Edit**.
Test tone	This field indicates if a test tone has been enabled on a particular service or not.
AC/s	Audio Clipping/second. This function reports audio clipping and is updated every 10 seconds. Clipping of audio can be reduced by configuring the audio level adjustment (can be found by clicking on **Edit**).

To configure each service, select the service name from the drop down box. Ensure the **RF Enable** check box is unchecked.

To configure individual outputs, click **Edit**. The resulting user interface is displayed in the figure below. Depending on the choice of RDS mode, the page will display different options.



Under **Radio**, the following parameters are available:

RF Enable	Enable or disable RF modulation
Current Service	Displays the selected service; not configurable in this screen
Backup Source	Choose a backup source from the drop down box
Switching Mode	Choose one of the following: • Off • Once • Floating • Reverting
RF Frequency (MHz)	The output frequency of the particular service
Audio level adjustment (dB)	The output audio level can be adjusted to achieve the desired deviation. Adjustments between 12 and -12 dB can be made in 0.5 dB steps.
Audio clipping per second	This is a read-only parameter giving an indication of digital clippings per second; ideally its value should be 0 if the audio level is adjusted correctly.
Descrambler	The descrambler that may be used to descramble the input device before it is sent to the radio card for decoding.
Language	Select a language from the drop down box

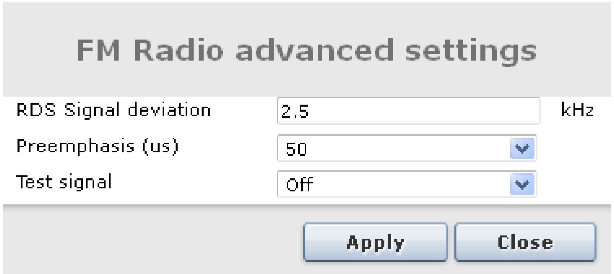
Refer to the **Input Redundancy** section (12.1) for more information on the **Backup source** and **Switching Mode** parameters.

For **RDS Mode**, the following parameters are available:

RDS Mode	Radio Data System mode. Choose one of the following: • Off • Manual • Auxiliary • Ancillary

To aid audio level adjustment, a deviation histogram is provided on the right. To view this diagram a browser or browser add-on that supports SVG (Scalable Vector Graphics) is required. Firefox version 2.0 and above supports this natively while Microsoft® Internet Explorer® versions 6 and 7 require a third-party add-on.

A few options not commonly used are available by clicking the **Advanced** button, next to **Apply**.



The following parameters are available in this dialog:

RDS Signal deviation	Signal deviation (kHz) – the default value is 2.5 kHz, valid input range is 0.1 – 9 kHz on 0.1 kHz steps.
Preemphasis (µs)	Default is 50 µs; otherwise off.
Test signal	Possible values are Off, 1 kHz L, 1 kHz R, 1 kHz L+R, Sweep L, Sweep R, or Sweep L+R.

10.1.3 Configuring RDS Output

The FM Radio module supports a subset of RDS data transmission as specified in EN 50067. The subset supported currently consists of the following RDS data signaling elements:

- PS
- PTY
- RT
- PIN
- MS
- "Clock-Time and Date"
- "Slow labeling codes"

RDS transmission is enabled when the appropriate input data source is selected from the RDS Mode drop down box. The default value is no RDS transmission (Off). Three different sources of data are supported: **Manual**, **Auxiliary** UECP and **Ancillary** UECP.

Manual enables the operator enter PTY, PS, and RT data.

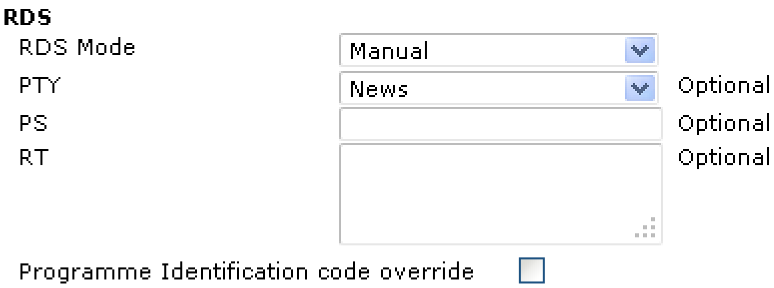
Ancillary requires that UECP information has been inserted in-band into the MPEG stream according to the CENELEC European Standard EN 50067[6].

Auxiliary requires that EUCP data be inserted in a separate PID in a proprietary format. For more information on supported formats, contact the Appear TV sales team.

We currently have two operational modes for UECP addressing, manual and automatic. In automatic mode it is assumed that the incoming stream only contains information about one service/dataset at a time. The automatic mode will follow the PSN/DSN of the last received command/data packets and use these for building the outgoing RDS. If the incoming UECP stream contains information for multiple services/datasets manual addressing must be used to select the appropriate information. It is allowed to enter only the relevant information, e.g. only PSN is required in the case of multiple services and only one dataset. Leaving a PSN/DSN field blank causes automatic behavior for this field.

In ancillary mode it is usually only information related to the service present, while in auxiliary mode (separate PID) it may be data for several services in the UECP stream.

10.1.3.1 Manual RDS



The following parameters are available:

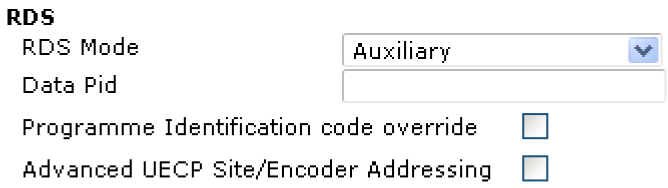
PTY	Manual Program Type – offers all 31 program types predefined in the RDS specification.
PS	Program Service – holds the eight character static display of the station name; this information is displayed by receivers and can be cached by receivers as part of stored presets.
RT	Radio Text – the field holds up to 64 characters.

When the in-band signaling is missing information, the values entered in "RDS Mode: Manual" are used instead. To configure this, first change the "RDS Mode" to "Manual" and enter the defaults. The "RDS Mode" can then be changed back to "Ancillary" or "Auxiliary". If for example the "PS" field is missing in the UECP signaling the default value will be transmitted. Missing is defined here as never received; this means that if the field is received once in the UECP then this value will continue to be used.

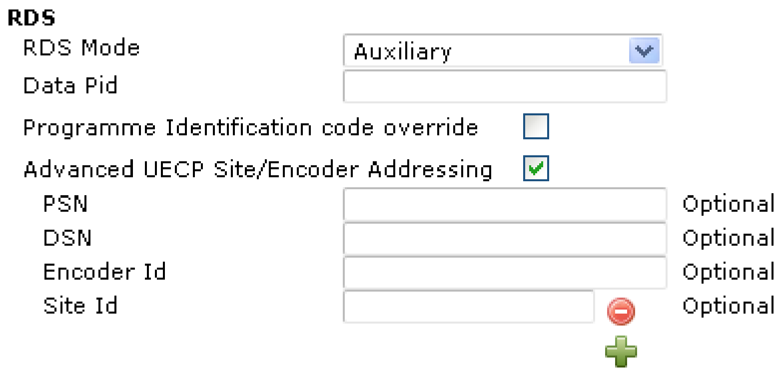
10.1.3.2 Ancillary and Auxiliary RDS

The configuration alternatives for ancillary and auxiliary RDS differ in that a data PID may need to be specified for the auxiliary stream. When the auxiliary option is enabled, an extra parameter – **Data PID** – is visible on the configuration page. If a data PID is not specified, the device will attempt to select the PID automatically.

[6] Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87.5 to 108.0 MHz



The Advanced UECP Site/Encoder Addressing choice enables access to UECP data filtering settings. If the auxiliary/ancillary data only contains information about one service, these settings are not required. If there is more than one radio service signaled in the UECP data, the following optional filtering elements can be specified to obtain the correct RDS information.



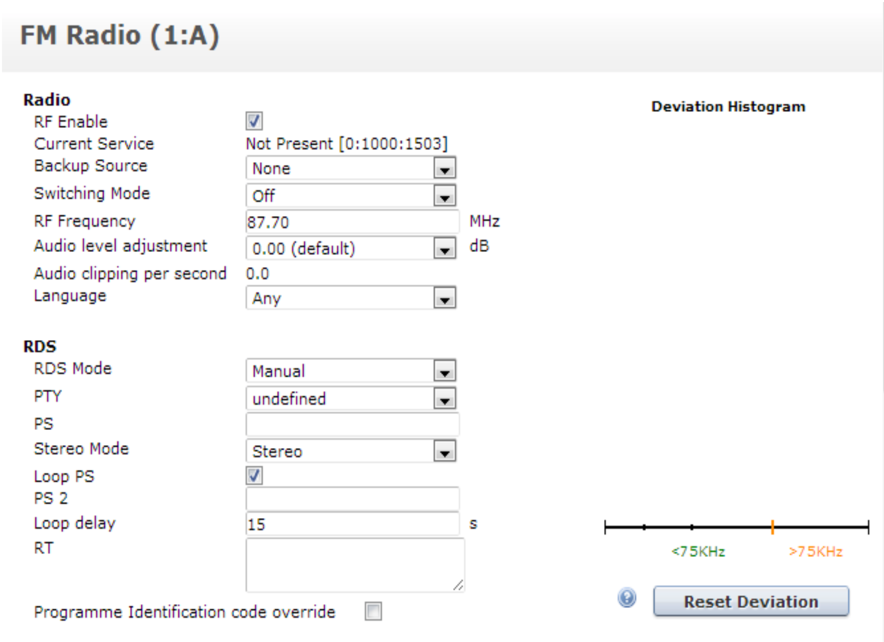
PSN	Programme Set Number – manually select which programme set should be decoded from the UECP stream.
DSN	Data Set Number – manually select which programme set should be decoded from the UECP stream.
Encoder Id	Select the RDS encoder's ID – only one encoder ID can be entered.
Site Id	Select which site ID this RDS encoder belongs to – the operator can select multiple site IDs.

Adequate information to uniquely identify a single set of service information is required. If insufficient filtering information is specified, the transmitted RDS data will contain all unfiltered information. This scenario can cause undefined behavior on a receiver.

As a precaution, we recommend that RDS data transmission be verified by a test receiver, if complete filter specification is unavailable.

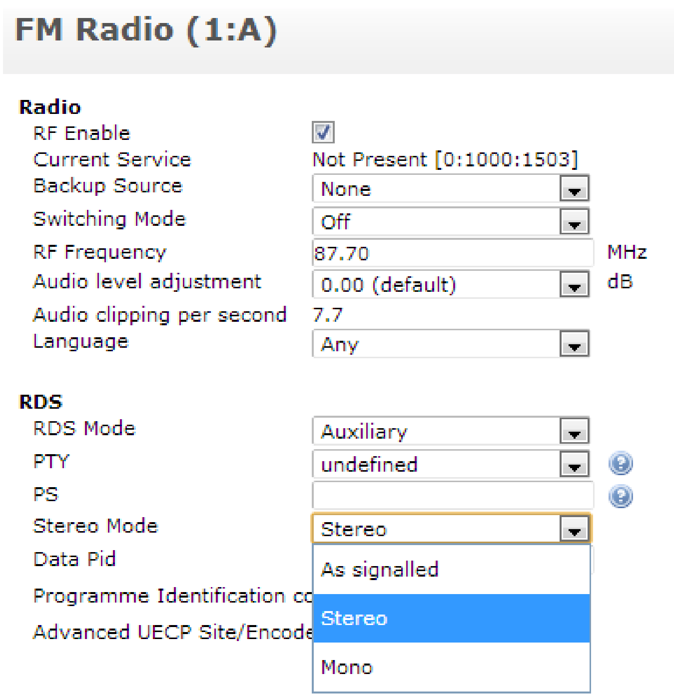
10.1.3.3 Dynamic Looping

Selecting the "Loop PS" allows the user to enter a second PS and a "Loop delay" in seconds. The "Loop delay" defines how often outgoing PS toggles between the PS and PS2 field.



10.1.3.4 Stereo override

The stereo override feature allows the user to bypass the in-band signaling. The user can choose between "Mono", "Stereo" or "As signaled".



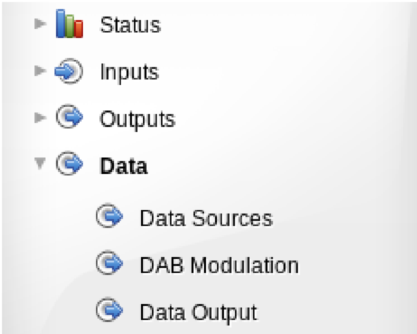
10.2 DAB Output Configuration

The Appear TV DAB/DAB+ modulator is a professional broadcast solution for providing digital radio services in cable networks. It is a high-density modulator capable of DAB/DAB+ transmissions in Band III, from 174 MHz to 260 MHz.

i	Please note that the DAB modulator does not include a DAB multiplexer, so the DAB multiplexes (also known as DAB ensembles) must be generated outside the Appear TV chassis.

10.2.1 Data configuration

The DAB user interface is organized under the "Data" top-level node. The configuration is split into three parts. One page where the user defines the data/EDI sources and two "output" configuration pages: DAB modulation and transparently mapped data outputs.



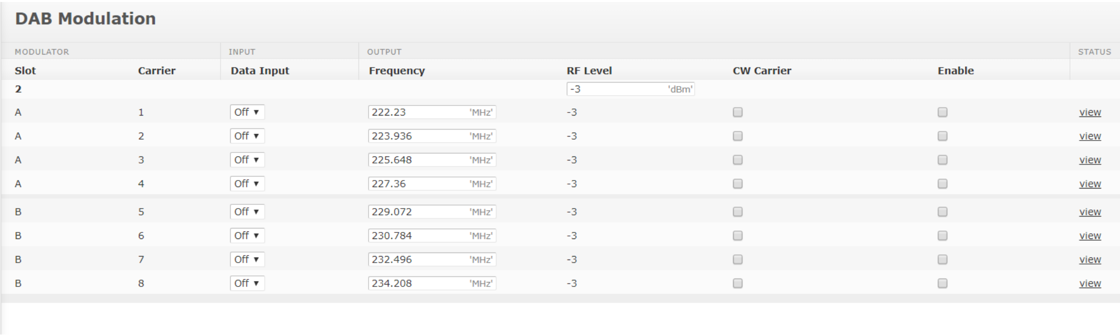
10.2.2 Data source

The source page is where the EDI/UDP/IP input stream is configured:

Port	The physical IP port (module) where this EDI stream is present in the network. All supported IP ports are shown in the dropdown list. If any VLANs are configured for this port, a separate dropdown box will be used to select the VLAN used.
IP	The destination IP address of the unicast or multicast carrying the EDI stream.
UDP port	The destination UDP port of the unicast or multicast carrying the EDI stream.
Source IP filtering	Set the IGMPv3 source-specific multicast (SSM) address. If unchecked, any multicast source will be allowed
Label	Internal display name of the source. Use the label field as a convenient way of keeping track of the different DAB multiplex names.

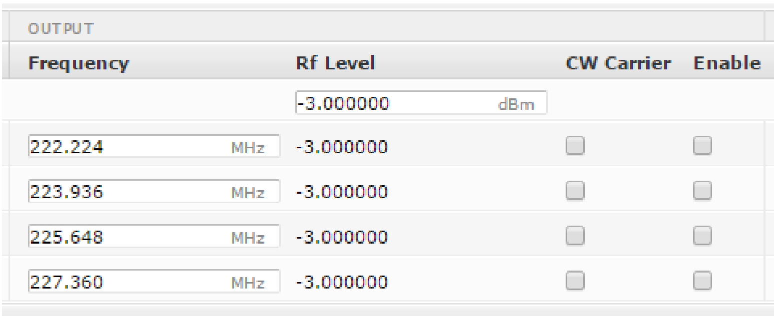
10.2.3 Configuring DAB RF Output

To configure DAB module parameters, from the Navigation Pane select the **DAB Modulation** menu in the Navigation Pane. The settings page below will be displayed:



The DAB settings interface displays the following values under the **Module and Input** section:

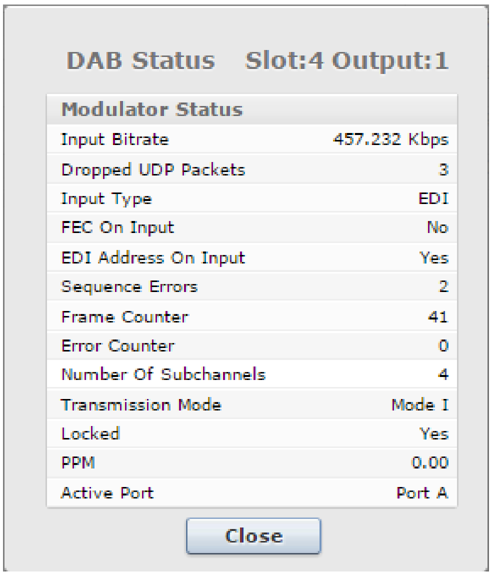
Slot	Specifies the slot of the DAB modulator
Port	For every modulator there will be four RF channels, where each channel represents one DAB multiplex
Data Input	The physical IP port (module) where this EDI stream is present in the network. All supported IP ports are shown in the dropdown list. If any VLANs are configured for this port, a separate dropdown box will be used to select the VLAN used.



The DAB settings interface displays the following values under the **Output** section:

Frequency	The RF frequency for the DAB multiplex in the range 174MHz to 260-64 MHz (band III). The four RF channels within a modulator must be set within a 40MHz block. The minimum spacing between DAB channels is 1.536MHz
RF level	RF level in the range -12dBm to +2dBm
CW Carrier	When enabled, the output will be an unmodulated continuous wave. The channel must be enabled for this feature to work
Enable	Enable the RF output of the channel

The status pane provides a view button that will show a popup window with additional status.

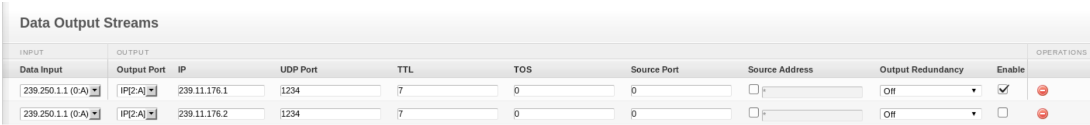


The DAB settings interface displays the following values under the **status view** section:

Input Bitrate	Current bitrate of the DAB input stream.
Dropped UDP packets	Total number of UDP packets dropped by the EDI input parser due to errors
Input Type	Will show the input format (typically EDI)
FEC on Input	Set to Yes if the input EDI stream includes FEC, No otherwise. Note: IP FEC input streams are not supported
EDI Address on Input	EDI stream contains valid address fields
Sequence Errors	Total number of EDI sequence errors
Frame Counter	Number of DAB logical frames received last second. Should be 41-42 (one logical frame every 24ms)
Error Counter	Total number of DAB logical frames dropped due to errors.
Number of Sub channels	Number of DAB sub channels (services) in the DAB multiplex (0-64)
Transmission Mode	DAB transmission mode
Locked	The lock status of the DAB input stream
PPM	This will show the current frequency offset in parts per million (PPM) of the EDI source.
Active port	For Seamless (A+B) input ports, this will show which port is currently active

10.2.4 Data Output

The Data Output is used for mapping a non-MPEG TS (ie DAB) stream from an input port to an output port. The pane is where the parameters of the outgoing, transparently mapped data streams are configured together with the redundancy mode



Output Port	The physical IP port (module) where the EDI/data stream will leave the unit. All supported IP ports are shown in the dropdown list
IP	The destination IP address of the unicast or multicast carrying the EDI stream.
UDP port	The destination UDP port of the unicast or multicast carrying the EDI stream.
TTL	Set the IP header Time to Live value
TOS	Set the IP header Type of Service value
Source Port	Override UDP header source port
Source Address	Override IP header source address
Output Redundancy	Activate or deactivate output redundancy
Enable	Enable the stream on the output module

11 Digital Processing Modules

11.1 Audio Leveling Module

The Audio Leveling card is able to adjust the audio level for up to 250 audio PIDs. The leveling process operates purely in the digital domain which means there is no signal degradation associated with this process.

The concept with the Audio Leveling card is to be able to adjust all the outputs to the same audio level so that zapping between channels will be more comfortable.

Figure 11.1 - Audio Leveling Effect

The audio leveling card is intended to be used with all available outputs.

The audio leveling parameters are configured as part of the service output setup.

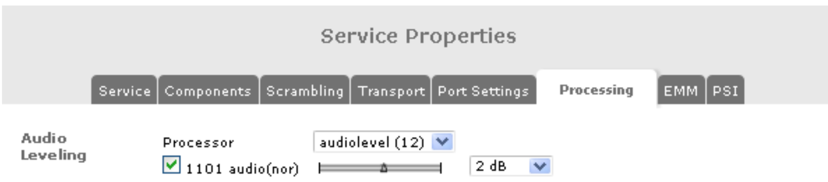


Figure 11.2 – Setting up Audio Leveling

The following parameters are available:

Processor	Select the audio leveling card to route the input stream through – the unit supports multiple cards per chassis.
Check box	Enable the audio leveling algorithm
Slider/Dropdown box	Adjustment level – the range is +/- 30dB, in steps of 2dB

11.2 Electronic Program Guide (EPG)

The Electronic Program Guide (EPG) module is responsible for collecting event information from all incoming transport streams, usually via PID 18, and regenerating this information for EPG-enabled outgoing networks.

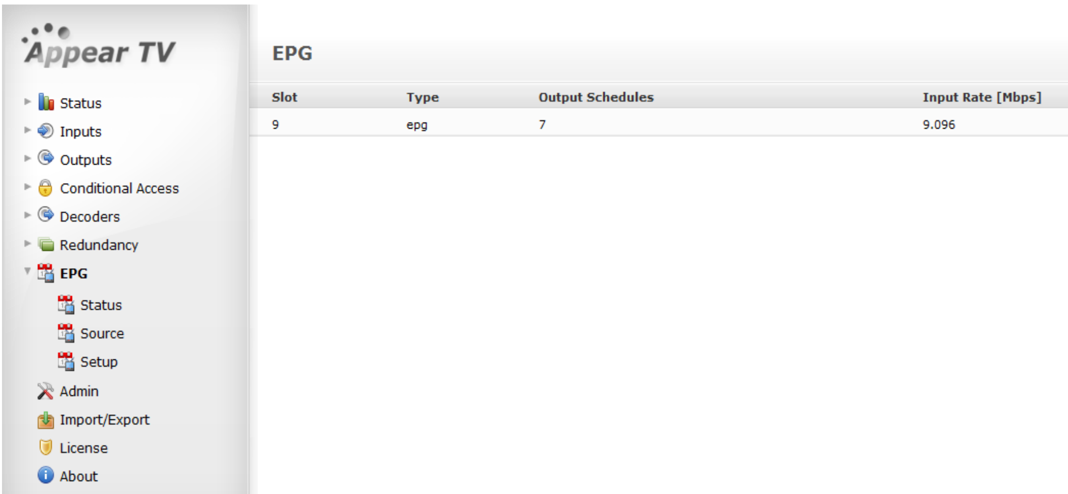


Figure -11.3 - EPG Node

The EPG node has three sub-nodes:

- Status – the Status node displays the EPG status for all outgoing transport streams aggregated according to each network.
- Source – the Source node displays
- Setup – Configure matching criteria for incoming EIT tables, manually defining EIT PIDs, EPG synchronisation and other miscellaneous parameters

11.2.1 EPG Status

The EPG Status node (Figure 11.4) displays all outgoing transport streams carrying EPG data. The data is aggregated according to each network service configuration.

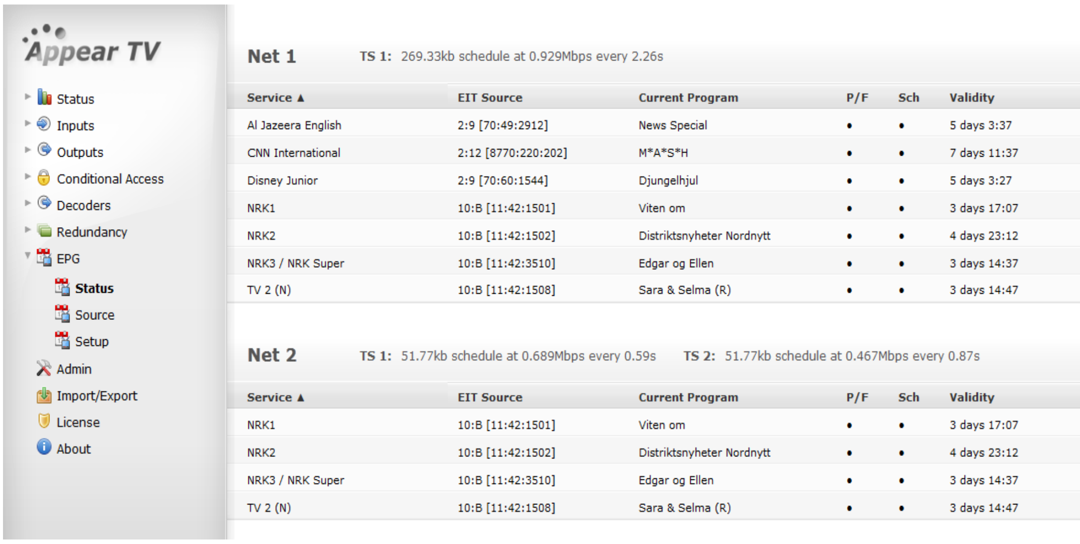


Figure 11.4 - EPG Status Node

The following information is displayed per output Network:

kb	Size of the EPG carousel to be played out in kb
Mbps	Outgoing bitrate, as defined during output configuration

Rotation time	The time required for the EPG playout to complete one cycle. If the priority of the first 12 hours is activated, then the cycle time of these 12 hour events will be reported.
Service	Service name will be displayed for EPG.
EIT Source	Event Information Table source.
Current program	Service name of current program being displayed.
P/F	Present/ Following status.
Sch	Schedule status.
Validity	Secify the Validity of the scheduled service.

11.2.2 Setting up EPG

To set up EPG for your output transport stream, select **EPG → Setup**.

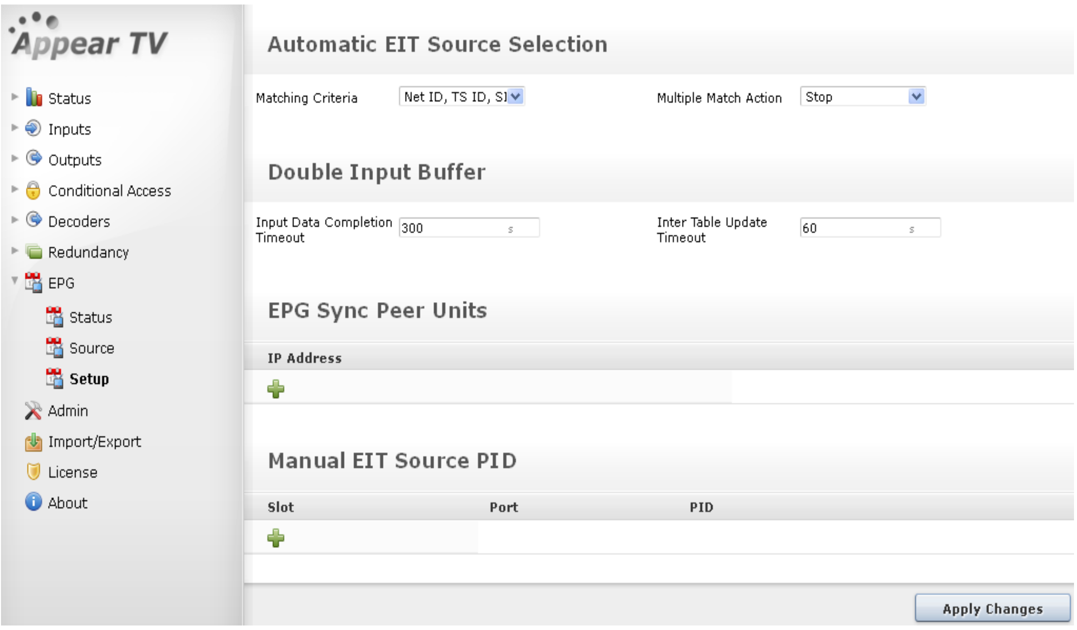


Figure 11.5 - EPG Setup

The following parameters are available for configuration:

<u>**Automatic EIT Source Selection**</u>

Matching Criteria	Used to determine which component(s) of the triplet (NET ID, TS ID, and SID) will be used to match EPG information with its service.
Multiple Match Action	Lists the course of action that should be chosen if there is more than one service available for the matching criteria.

	The fewer parameters you match on, the higher the chance is to get multiple matches

Double Input Buffer

Double input buffering allows for a more intelligent EPG update algorithm. In addition, it also enables the system to flag warnings if the input is corrupt.

The following parameters are available:

Input Data Completion Timeout	If the EPG for a particular service is not complete within this timeout, then the system will play the already received data. The default value is 60 seconds.
Inter Table Update Timeout	The EPG data is transmitted in different tables, according to the time which the data describes. For example: EPG for day one is transmitted in a different table_id compared to EPG for day six. This parameter specifies the duration the system should wait between table_ids before it starts to regenerate the content. If the parameter's value is low, it is likely that the system will regenerate several times during the transfer of EPG covering many days. The default value is 300 seconds.

EPG Sync Peer Units

In a system with many units, e.g. in a QAM network, there may be a few units belonging to the same network. In this system, the outgoing EPG should signal all the services.

To synchronize your units, go to **EPG → Setup** and list the IP address for each remote EPG module (*not* IP address for the MMI) under **EPG Sync Peer Units**.

Figure 11.6 - EPG Sync Peer Units

The EPG module's IP address can be configured under the **Admin** node.

	Currently the system only supports synchronization of up to *five* remote EPG modules.

Manual EIT Source PID

By default, all PID 18 information is automatically sent to the EPG processing card. If EPG information for certain inputs is not on PID 18, it is possible to manually set the PID value using the **Manual EIT Source PID** box.

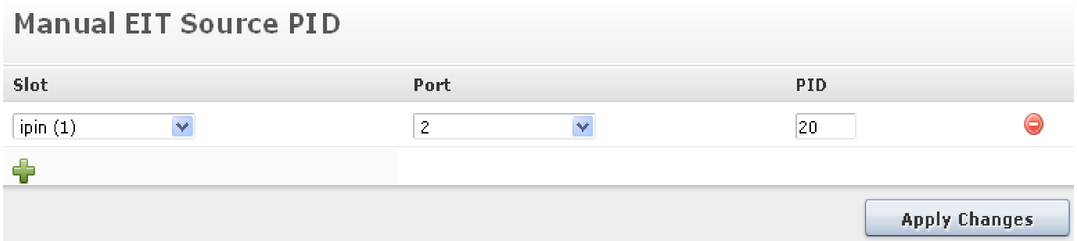


Figure 11.7 - Manually adding an EIT Source PID

> Design of the EPG behavior is based on the ETSI EN 300 458 V1.9.1 (2009-03) standard along with ETSI TR 101 211 V1.9.1 (2009-06) guideline.

11.3 Adding EPG information to a Transport Stream

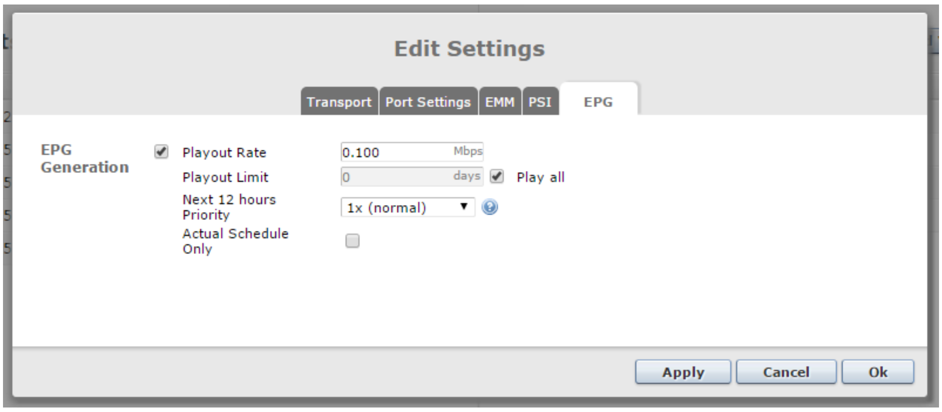


Figure 11.8 - Setting up EPG within the Outputs Node

Typically, schedule information is carried only on one transport stream per network. To enable EPG regeneration, select the outgoing transport stream on which EPG information will be broadcast using the following steps:

1. Select **Outputs** from the **Navigation Pane**
2. Select the particular output module
3. Double click on the output transport stream of your choice
4. Select the **EPG** tab
5. Check the **Add EPG** checkbox
6. Finally, set the parameters accordingly

The output transport stream will contain schedule information for all channels within the same network, grouped according to outgoing Network ID.

EPG can be enabled on more than one transport stream within a network – all these streams will then carry full schedule information, if they are available from the source.

The EIT schedule will be merged with the EIT Present/Following and Actual/Other.

11.3.1 Playout Rate, Playout Limit, and Priority

There are three parameters that can be modified when configuring your schedule information:

Playout Rate	The amount of bandwidth you want to allocate for schedule and present/following information (the higher the playout rate, the shorter the rotation time).
Playout Limit	The amount of schedule information being sent out.
Priority	The number of times schedule information for the next 12 hours is repeated in your carousel.
Actual Schedule Only	When enabled, the EIT-Schedule Actual table will only be sent on this output. The EIT Schedule Other will be disabled.

Assuming 1 rotation = *r*, the figures below illustrate these three parameters and how they can influence the output of schedule information.

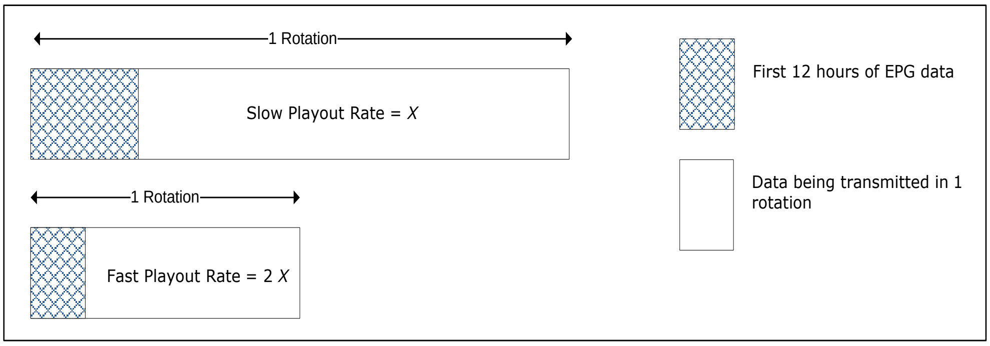


Figure 11.9 - Setting a Playout Rate

Figure *11.9* above illustrates the amount of schedule information sent in one rotation if the **Playout Rate** is modified.

- In the first box, suppose the **Playout Rate** is *X*.
- In the second box, we double the **Playout Rate**, effectively increasing it to 2 *X*. Consequently the size of one rotation will be halved, making it equivalent to ½ *r*.

	When choosing a suitable **Playout Rate**, be aware that this also includes present/following – Actual and Other. If the **Playout Rate** is too low, present/following actual will be given priority over present/following other; schedule will be inserted if/where there is room.

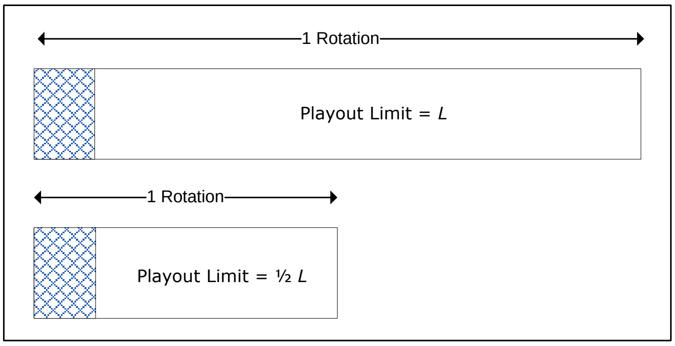


Figure 11.10- Setting a Playout Limit

Figure 11.10 *illustrates the amount of schedule information sent in one rotation if the Playout Limit is modified.*

- In the first box, suppose the **Playout Limit** is *L*.
- In the second box, we reduce the **Playout Limit** to ½ *L*. This reduces the amount of schedule information being output. Consequently the size of one rotation will be halved as well, making it equivalent to ½ *r*.

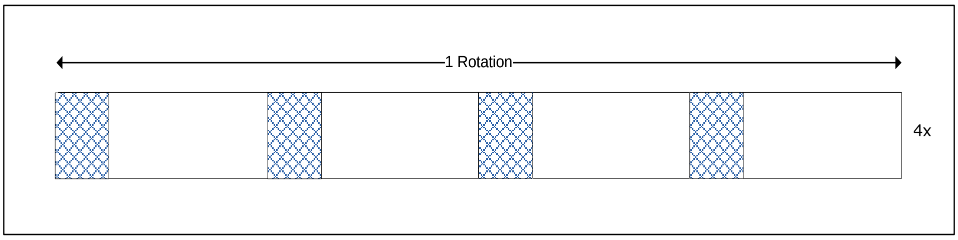


Figure 11.11 - Setting a Priority

To improve the time it takes for schedule information to load, you can assign a **Priority** value for the next 12 hours of data. Suppose you choose **4x**, then the 12 hours of data will be repeated four times in one rotation. Consequently, this will increase the size of your rotation.

11.3.2 EIT Source Setup

Once the output transport stream is setup, the information will be displayed in the **EPG** node.

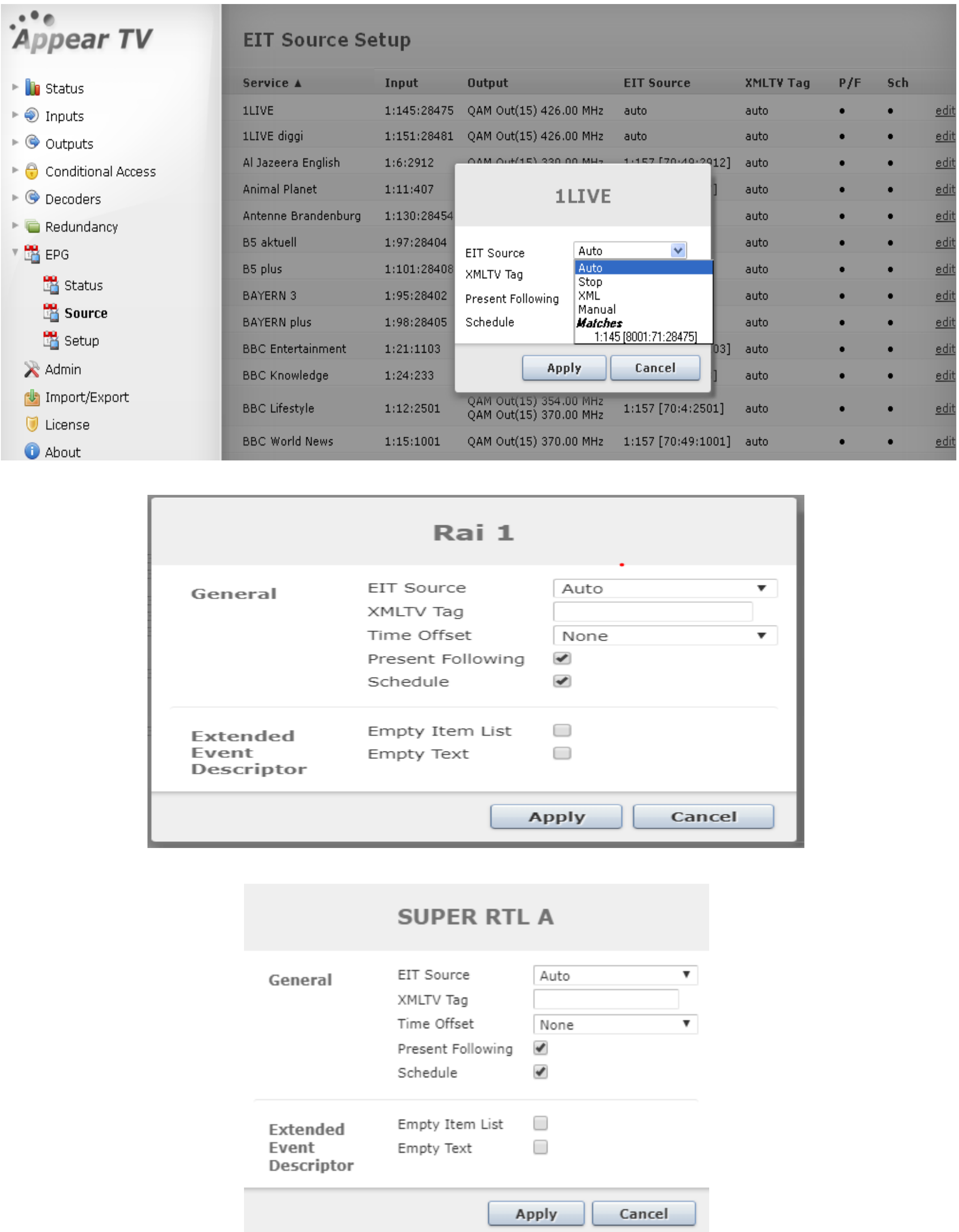


Figure 11.12 - EPG Node

If multiple services are available for the matching criteria, a drop down box is displayed under EIT Source; pick the best course of actionThe user must configure the **EIT Source** for the outgoing service being configured. The following options will be presented in the corresponding drop-down menu:

AutoAuto	Corresponds to the value chosen in the **EPG Setup** node, under **Matching Criteria**. If multiple sources match, it will select one according to the **Multiple Match Action** setting..
Stop	Ensures that no schedule information is transmitted from this service. If no drop down box is displayed, it means that there is only *one* source available based on the matching criteria.

XML	Specify an XMLTV tag name for schedule information. This relies on EPG XMLTV import which is covered in the AppearTV EPG XMLTV Interface document. By default, if no tag is specified, this will be <NetID>.<TSID>.<ServiceID> corresponding to the output service,The EPG schedule will not be taken from an EIT table from an input source but from an external XMLTV file that will be transferred to the EPG module. Please refer to the "AppearTV EPG XMLTV Interface" document for more details.
Manual	Manually specify an incoming source (Slot, Port, NetworkID, TSID, ServiceID) of EIT information
Matches	If more than one input source match the outgoing service, according to the **Matching Criteria** configured in the **EPG Setup** node, it will list all of them.

Other settings must be configured:

XMLTV Tag	Specify an XMLTV tag name for schedule information. This relies on EPG XMLTV import which is covered in the "AppearTV EPG XMLTV Interface" document. By default, if no tag is specified, this will be <NetID>-<TSID>-<ServiceID> corresponding to the output service.
Time Offset	Apply a time offset to the EPG schedule if required, choose "None" otherwise.
Present Following	Enable if EPG module should re-generate outgoing EIT table for Present (Current program) and Following (Next program)
Schedule	Enable if EPG module should re-generate outgoing EIT table for full schedule
Extended Event Descriptor	Enable if these elements in the EIT table are causing some EPG display or presentation issue in the set-top-box, to remove them from the EIT table. Disabled by default.

The EIT extended event descriptor contains a list of items. This list is used to hold set-top box configuration.
In order to configure the user can launch EPG Source page and can edit for each service.
There are two new checkboxes were implemented:

1.) Empty Item List.
2.) Empty Text.

The default option is to do nothing.

12 Redundancy Support

The unit supports several types of redundancy. While each redundancy module is aimed to solve different problems, the system handles all of the modules in a similar way, providing some general parameters to control the switch delay and which triggers should be active for each module.

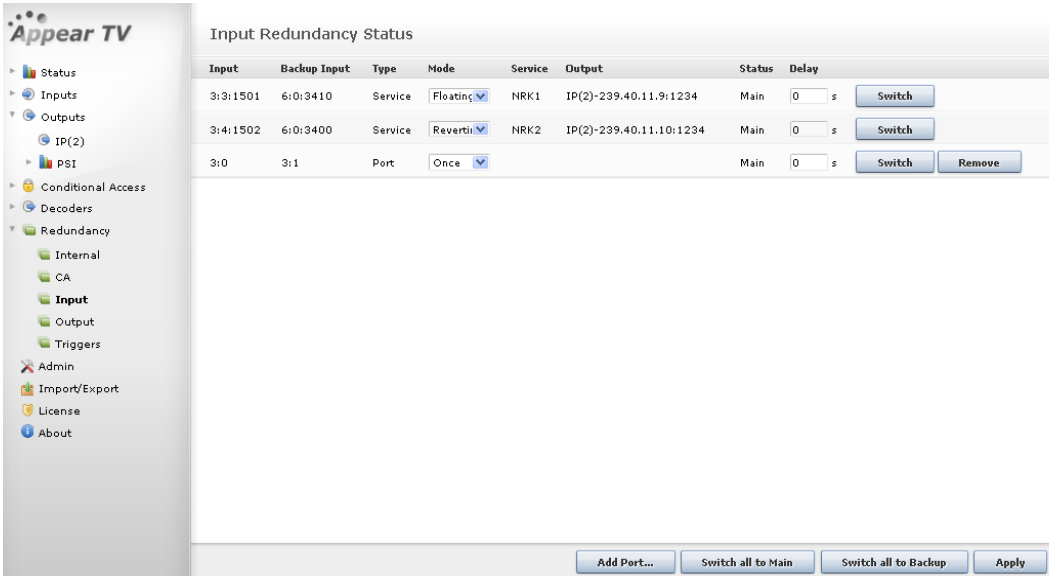
12.1 Input Redundancy

The goal of input redundancy is to prevent failures outside the system from resulting in errors on input cards.

Input redundancy is managed by the Man Machine Interface (MMI) board which determines when to switch:

- From one service (**Main**) to another service (**Backup**), or
- From one port (**Main**) to another port (**Backup**).

However, it is possible that both these services and ports have different content.



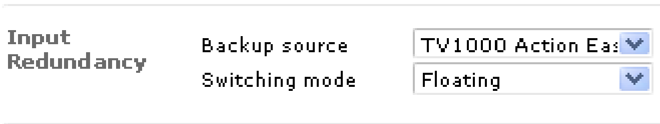
Input	Input port or service; the notation is <X:Y:Z> where: • X – input module's slot position • Y – input module's port • Z – service SID
Backup Input	Backup input port or service; the notation is <X:Y:Z> where: • X – input module's slot position • Y – input module's port • Z – service SID
Type	Type of input redundancy, either **Service** or **Port**.
Mode	Displays the switching mode being used.
Service	Outgoing value

Output	Outgoing value
Status	Shows the current redundancy status, either: **Main** – inputs are routed from the main input source **Backup** – inputs are routed from the backup input source

Click **Switch** to change the current active input. If the current active input is **Main**, the input source will switch to **Backup** and vice versa. For port-based input redundancy entries, an additional **Remove** button is visible. Click **Remove** to remove the port for which input redundancy is configured.

12.1.1 Configuring Service-based Input Redundancy

Service-based redundancy is set up under the **Outputs** node. Double click on a service of your choice to access the **Service Properties** dialog. Under the **Input Redundancy** section, select the appropriate parameters.



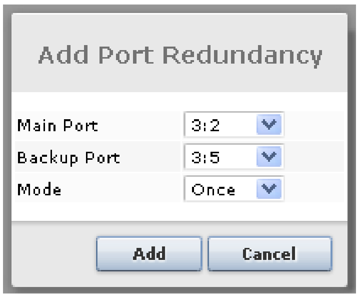
The following parameters are available:

Backup source	Assign a backup service; choose **None** to disable input redundancy.
Switching mode	Select a suitable mode for each redundancy pair. The following modes are available: **Off** – Stop switching whether it is on main or backup **Once** – Switch from main to backup when an alarm occurs on main and remain there **Floating** – Switch when an alarm is set on the service that is active, ignore clear alarms **Reverting** – Switch to backup only if there is an alarm on main but not on backup; switch back when alarms on main are removed or set on backup (this is the recommended mode).

Input redundancy on Scrambled MPTS inputs must be configured carefully. This is because if the input must be descrambled it is not possible to select different descrambler modules for each service (main and backup). In other words, all inputs to the descrambler must be routed from the same input source. Currently the system does not enforce this requirement; hence it is recommended that caution be exercised when combining descrambling with input redundancy.

12.1.2 Configuring Port-based Input Redundancy

Port-based redundancy is set up under the **Redundancy → Input** node. Click on the **Add Port** button and the **Add Port Redundancy** dialog below will appear.



Main Port	Assign a main port
Backup Port	Assign a backup port
Mode	Select a suitable mode for each redundancy pair. The following modes are available: **Once** – Switch from main to backup when an alarm occurs on main and remain there **Floating** – Switch when an alarm is set on the service that is active, ignore clear alarms **Reverting** – Switch to backup only if there is an alarm on main but not on backup; switch back when alarms on main are removed or set on backup (this is the recommended mode).

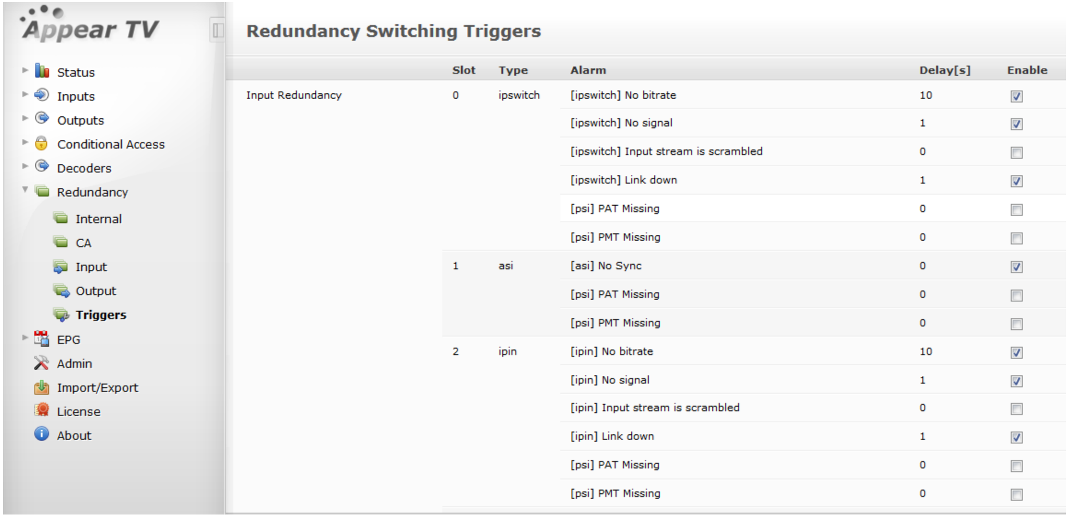
When using port-based input redundancy, it is intended to have the same input structure for both main and backup ports.

Port-based input redundancy applies to transparent transport streams and imported PIDs.

12.1.3 Alarms that cause Switching

The system will automatically switch from main source to backup source based on the presence of alarms that are selected in the **Redundancy Switching Triggers** page below.

Switching Delay	Parameter is added to mention the number of **seconds** for the module to switch connections from one backplane to another when alarm occurs.



i	The switching hysteresis is not configurable MMI functionality remains on the same card after a switch Switching can be done manually via the GUI Switching behavior depends on the switching mode set individually for each pair Alarms that are filtered through the alarm filter GUI will not trigger source switching

12.1.4 Input Redundancy and the MMI

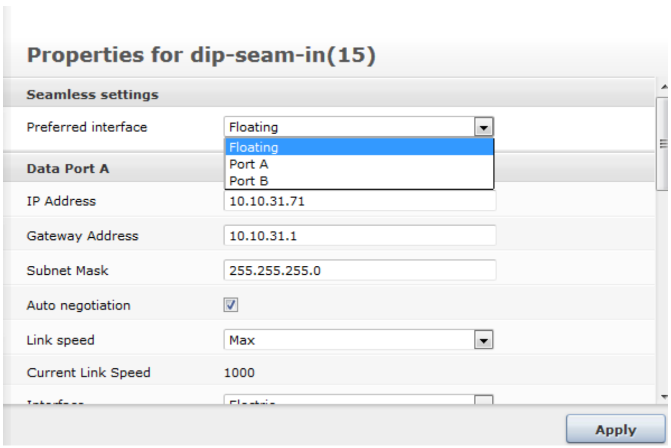
Input redundancy does not affect MMI functionality. If the main input module is configured as supporting the Man Machine Interface (MMI), this configuration will remain even though all input sources are switched from Main to Backup card.

12.1.5 Seamless Input Redundancy

The Seamless IP input module allows two input interfaces to be connected to different network sources, but for the system, this is a single module. Configured multicasts are subscribed to on both interfaces. Depending on the configuration, there are options for these multicasts must come from the same or different source.

12.1.5.1 Seamless IP Interface selection

For all Seamless IP input modules, it is possible to set the preferred port and/or redundancy switching mechanism. This is available on the **Admin** page of the Seamless IP Input module:

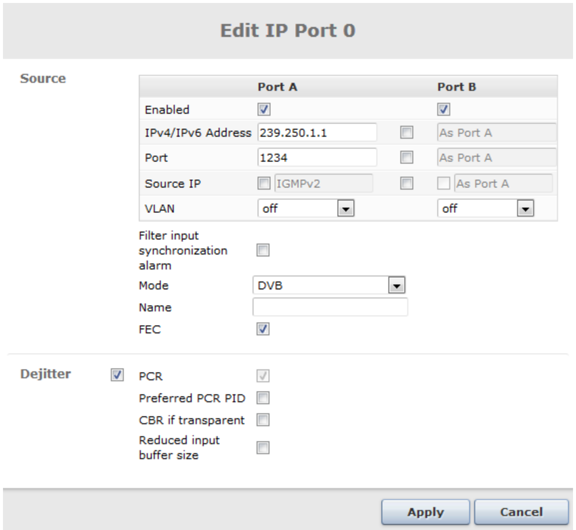


The values here represent the following modes:

Floating	Port A is the default port and on a failure, Port B will be used. The redundancy will not switch to Port A again until Port B fails.
Port A	Port A is the default port and on a failure Port B will be used. Once the filaure condition is cleared on Port A, the source will be switch back to this. (Reverting)
Port B	Port B is the default port and on a failure Port A will be used. Once the filaure condition is cleared on Port B, the source will be switch back to this. (Reverting)

12.1.5.2 Port configuration

When adding a source the default is that the multicast is configured by be received on both input interfaces on the input card, i.e both Port A and Port B. These defaults may be overwritten by editing the input. The following seamless specific attributes is shown in figure below.



Enable Port	This option is added to enable the operator to block one path -> hence forcing the input to be taken from the other port
Source IP	The source IP should be defined.
Filter input synchronization alarm	If source is not cloned output then if it is checked then will raised alarm for it. This option can be used to use Input Redundancy for multicasts from different sources. When in this module, the resulting stream will not be seamless. The switching time when 'No bitrate' on the main port is 100ms.

12.2 Internal Redundancy

Internal redundancy refers to the process by which select decoder and output modules can receive configuration from two different MMI boards, but not at the same time. This section describes internal redundancy for these cards in detail.

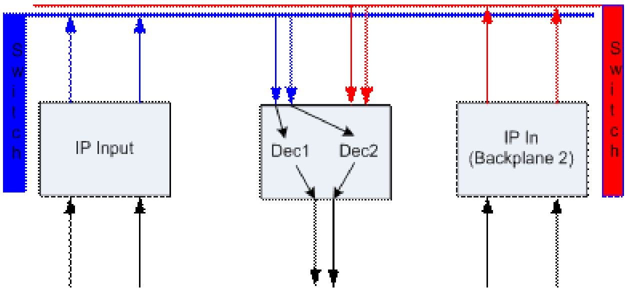
The chassis will have two switches/MMI modules. One switch will be configured as the main switch while the other switch will be configured to be the redundant switch.

The following cards support Internal Redundancy:

- DDM and ADM
- FM Radio
- ASI Output
- IP output
- Dual IP output
- Dual IP Cloned output
- Modulators

12.2.1 Dual backplane configuration

The figure below shows the signal flow within the unit when having two backplanes, one MMI card connected to backplane 1 and second MMI card to backplane 2 respectively.



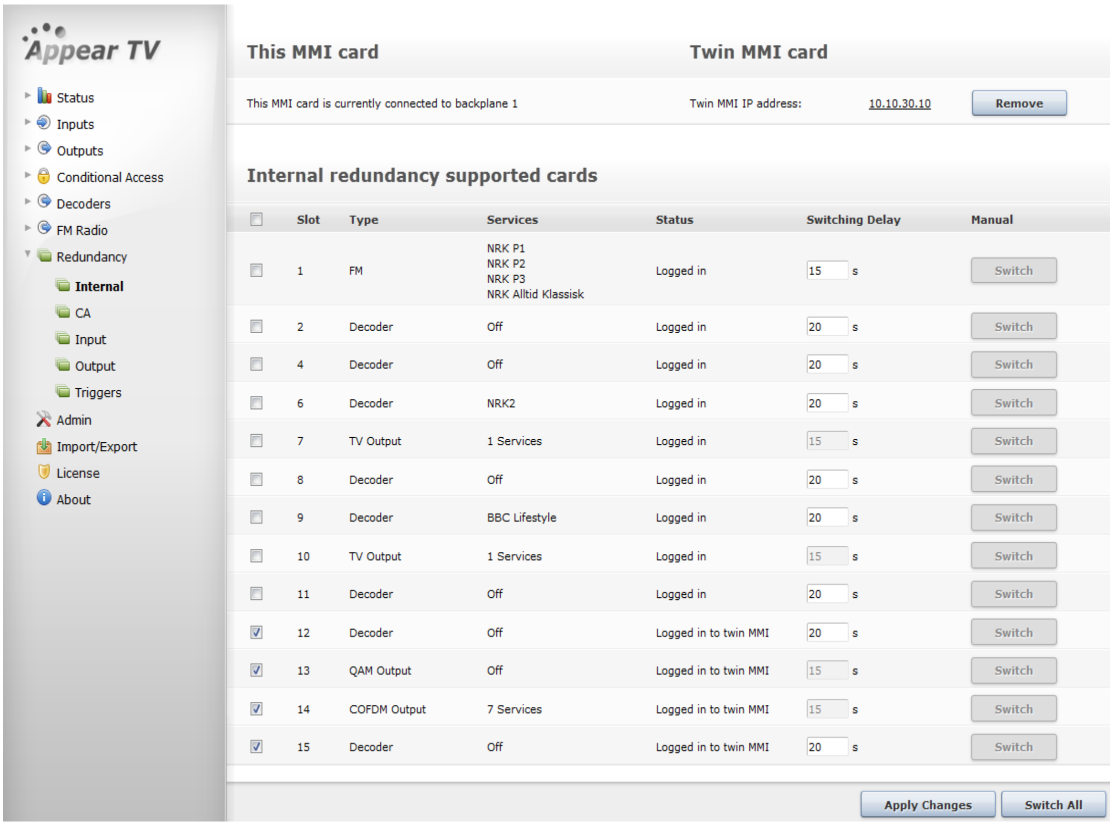
12.2.2 Hardware Requirements

The following hardware is required to implement internal redundancy, either:

Two Switch management cards and **Two** IP input modules
or
Two Switch + IP modules
In addition, one or more output modules are required to implement internal redundancy.

12.2.3 Configuring Modules for Internal Redundancy

Configuring internal redundancy is done by selecting Redundancy → Internal in the **Navigation Pane**. This will load the configuration page displayed below.



There are three sections on the Internal Redundancy configuration page:

This MMI card – displays the status of the MMI module in the chassis. This section is used as an indicator for MMI correlation. MMI correlation is needed to get rid of the card missing alarms on the spare MMI module. The status of the MMI module depends on which backplane it is logged in to.

Twin MMI card – displays the status of the Twin MMI card linked to this chassis, if there is one. The IP address of the redundant MMI module is used to notify the internal redundancy GUI about the module. This other MMI module is referred to as **Twin MMI**. Once a **Twin MMI** is added, both MMI modules will exchange their module list; all other configuration must be done separately on each MMI module.

Internal redundancy supported cards – displays a list of modules on which internal redundancy is supported, along with the service name (or number of services for QAM output modules), status, and switching delay. If internal redundancy is not enabled, the service name value is **off**.

An alarm with the message *Unable to communicate with TWIN MMI* is generated whenever connection breaks between MMI Input cards.

Enable	The check box must be checked to enable internal redundancy on the module. Each module can be configured at any time no matter which backplane it is logged in to.
Slot	The slot in which the module has been installed
Type	The type of module on which internal redundancy is being enabled
Services	Services currently running on that particular module
Status	The status of the module – whether it is logged into the main MMI or the Twin MMI module.

Switching Delay	Once the decoder, FM Radio, or QAM output module meets the described conditions to log in to the Twin MMI automatically, it still needs to wait a determined period of time. This switching delay is the number of *seconds* for the module to switch connections from one backplane to another. Once the switch delay time is reached, the module will switch backplanes. If the login succeeds and the input signal is correct, the video and sound will be back on the screen. The minimum value allowed for **Switching Delay** is: • 8 seconds for decoders • QAM/COFDM output fixed 15 seconds The default value is 15 seconds. If needed, the same module can have different **Switching Delay** values for each backplane. This parameter can be modified in the MMI even if the module is connected to another backplane.
Manual	This **Switch** button enables the operator to perform a manual switch from the GUI. When internal redundancy is enabled, this button will be available. The module will switch right after the operator clicks the button – without any **Switching Delay**.

Reboot

The Decoders, FM Radio and QAM Output modules are designed to log into the first available MMI board. They will always try to login to the Main MMI board first, which is connected to default backplane. But only during the boot process, if login fails through the default backplane, it will try to connect to the backup even if internal redundancy is disabled in order to find a MMI to login to.

i	For the Twin MMI to work properly, it is essential that both MMI modules have an IP connection.

12.2.4 Decoder Internal Redundancy

Decoder internal redundancy will be triggered by the following alarms:

- Transport stream missing
- Internal link down
- No contact with MMI module
- Video/Audio PID missing

If the decoder loses its link to the switch card it is currently connected to, it will attempt to switch backplanes. This can be simulated by actually removing the switch for the first backplane (the blue one). The effect will be that the decoder will stop communicating on the blue link and connect to the second backplane (the red one).

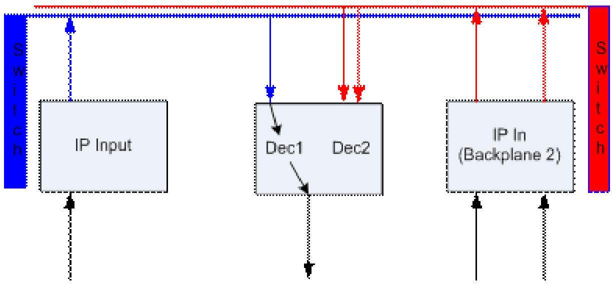
If a problem is detected in the configured *Decoder Channels*, i.e., if transport stream is missing on both the channels when they are configured, then the decoders will switch to the other backplane. This can be simulated by actually removing the data cable for Input card or by stopping the input signal.

When both channels are configured with a service, the decoder card will switch if both Channel A and Channel B meet the switch criteria. If just one channel is configured, then the decoder will switch if that channel (A or B) meets the switch criteria. There will be only one alarm when the decoder switches (not two alarms from both channels).

To switch decoders, internal redundancy must be enabled. Removing inputs from the GUI will not cause the decoder cards to switch.

Example When Switching does not occur

When you remove the inputs, i.e., you remove the configuration of the input streams you have a system with the following configuration.



This causes the input card to no longer subscribe to the multicast input, thus telling the system not to configure the decoder. Consequently, a decoder without a configuration will not try to switch, as nothing is wrong.

Decoder Switch Alarms

The table below lists the alarms displayed as a result of the switch:

Switched, reason: link down	Refers to internal link failure
Switched, reason: logout	The decoder module is logged out from the input module that hosts the MMI
Switched, reason: alarm	The alarm refers to input stream failure having caused the switch
Switched, reason: operator	The alarm refers to the operator having performed a manual switch

There is a delay of 15 seconds before the alarm appears.

12.2.5 QAM/COFDM/IP/ASI Output Internal Redundancy

When using QAM,COFDM , IP or ASI Output with internal redundancy the switching will be triggered with the following alarms/events:

- No signal
- No contact with MMI module

If **all** services configured for the output card stop receiving data, the **No Signal** alarm will be raised and the internal redundancy module will switch backplanes. This means that even if the services configured are not enabled to the output signal of the card, it will switch.

Another condition that will make the output card switch is when the card looses communication with the MMI Card. This could happen when the card cannot login to the MMI, when the switch is not working properly, or when the MMI card has been removed.

Digital Output Switch alarms

The table below lists the alarms displayed as a result of the switch:

Switched, reason: logout	The output module is logged out from the input card that hosts the MMI – for this module, it also refers to internal link failure.
Switched, reason: No bitrate	This alarm refers to input stream failure having caused the switch
Switched, reason: operator	This alarm refers to the operator having performed a manual switch

There is a delay of 15 seconds before the alarm appears.

12.2.6 FM Radio Internal Redundancy

FM radio internal redundancy will be triggered with the following alarms/events:

- No Data Input
- No contact with MMI module

If **all** the services configured for the FM radio module stop receiving data, the "No Data Input" alarm will be raised and the internal redundancy module will switch backplane.

Another condition that will make the FM radio module switch is when the card looses communication with the MMI Card. This could happen when the card cannot login to the MMI, when the switch is not working properly, or when the MMI card has been removed.

Alarms displayed as a result of the switch:

Switched, reason: operator	This alarm refers to the operator having performed a manual switch
Switched, reason: no contact with MMI board	This alarm refers to loss of contact with the MMI board having caused the switch
Switched, reason: no input data	This alarm refers to the loss of input data having caused the switch

There is a delay of 60 seconds before the alarm appears.

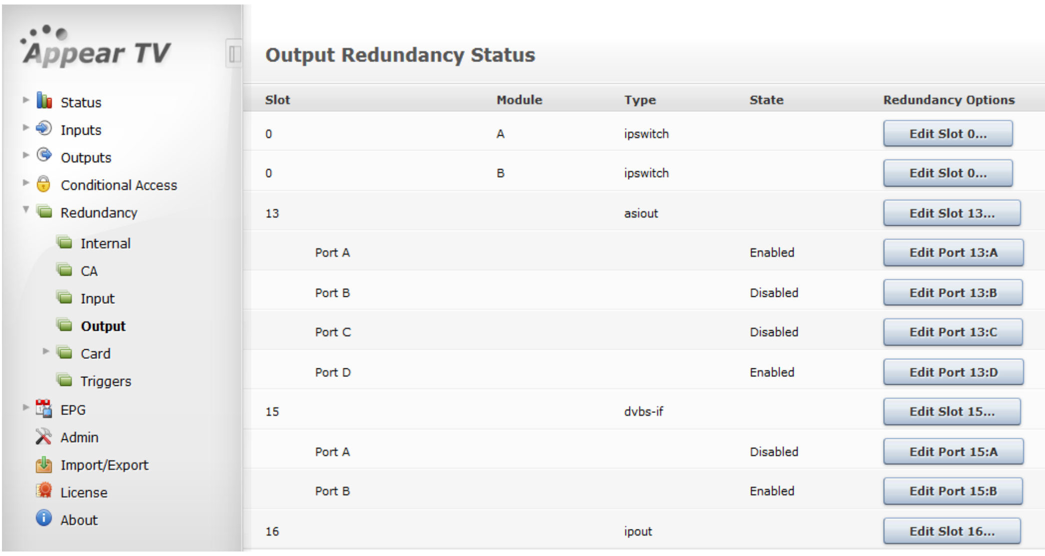
12.2.7 Cloned Link State Mode for Dual IP input MMI module

When in this mode, if there is a data port Link down/No signal on Port A, i.e. failure in the network/switch to input port A or loss of all the input services to that port, then the system will also force a Link down on Port B. With this, a failure in the inputs to port A will cause a total failure in all the inputs to the main MMI module (A and B) down. This is typically used in Internal Redundancy setups, where the output cards will switch to the backup MMI and backup backplane due to loss of all services, and will be then fed from data ports A and B from backup MMI.

This can be configured from the Maintenance Center as follows:

12.3 Output Redundancy

The output redundancy solution provided for the output cards is based on sending state events to an external switch which can then perform the appropriate redundancy switch. For the IP output card this event is the OSPF messages and for all other outputs the event is in the form of an SNMP alarm. This allows external equipment and switches to be configured to switch to a redundant source when these messages are received.

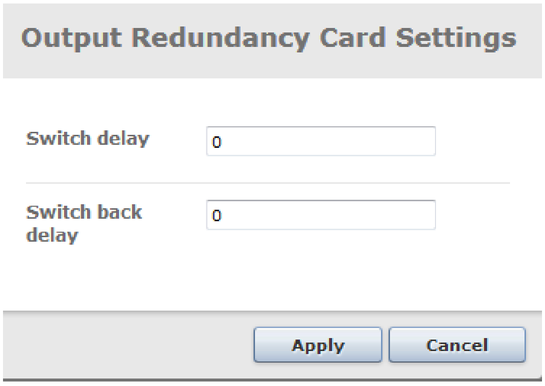


12.3.1 Non-IP cards Output Redundancy

For non-IP output modules, when there is an error with the output, the system will signal an 'Output Faulty' alarm for the specified output port. This is then read by external equipment using either the SNMP or SOAP interfaces in order to perform the redundancy switching. It is possible to configure the following options::

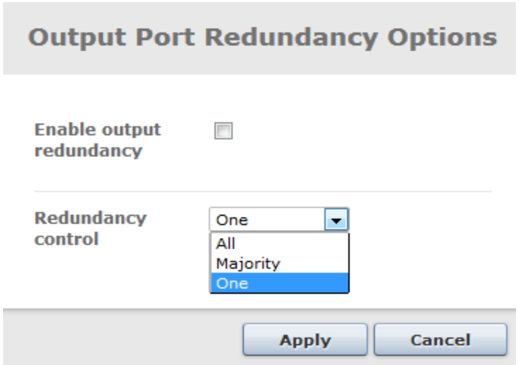
- Configurable switch and Switchback delay - per card
- Configurable switch mode (one/majority/all) - per port
- Manual triggering of the "output faulty alarm" trigger by disabling the output port.
  - For the QAM output card 8 transports is grouped into one Physical port. For this output all transports must be disabled before the "output faulty alarm will" trigger.

To configure the Redundancy options, select **Redundancy → Output** and click on the **Edit Slot X** button for a particular output module. This will open the **Edit Redundancy Options** dialog displayed below:



The following **Output Redundancy card setting** parameters are available:

Switch delay	Specify the Switch delay
Switch back delay	Specify the Switch back delay



The following **Output Port Redundancy options** parameters are available:

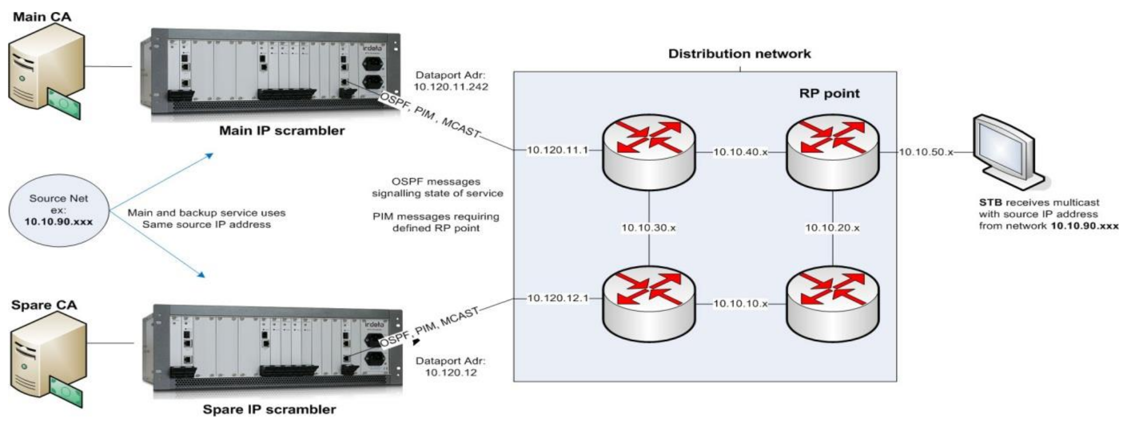
Enable output Redundancy	Option to Enable Redundancy on the port.
Redundancy Control	Choose one of the following options: All – The port is signaled to be faulty if all of the outgoing services are faulty Majority – The port is signaled to be faulty if the majority of the outgoing services are faulty. One – The port is signaled to be faulty if one of the outgoing services are faulty

12.3.2 IP Output Redundancy

The Appear TV "always-on" intelligent redundancy software is a seamless integration between broadcast equipment and IP networks; providing unmatched reliability of service up-time using the minimum amount of operating resources possible.

The IP output redundancy functionality makes it possible to have multiple units with IP output modules multicasting the same services and letting the network handle data loss.

By adding one or more redundant units with IP output modules, service outage may be prevented; given the error is an isolated one.



The IP output module sends services out as IP multicasts, relying on OSPF and PIM messages to configure the network. The routers use this information to route the multicasts. The network automatically detects the presence of more than one route and redundant packets are thrown away by the routers before they reach the STBs.

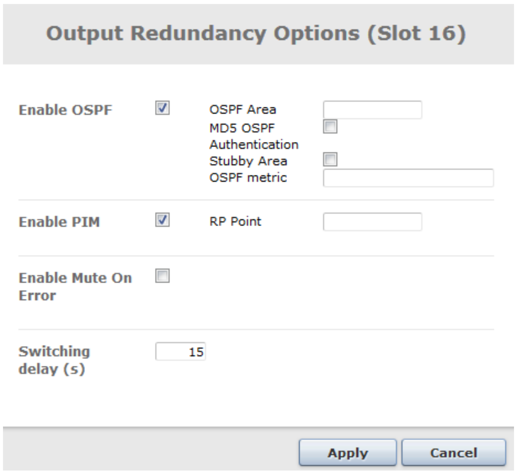
A typical scenario is to broadcast a Digital TV service from two locations using the same multicast destination address. The network is designed to route only one copy of the multicast stream to the receiver. In case of a source failure, with IP output redundancy implemented, the network should automatically switch to the spare source.

By assigning the same (Source, Group) address from the virtual segment for the "main" and "backup" service the routers regard the multicast from the "main" and the "backup" unit as one multicast origin from the virtual source network and will automatically chose to forward packets only from the one with the lowest cost. This is important and must be ensured when the unit is configured.

The output redundancy configuration is split on two locations. The global settings that applies to an output card, and the per stream settings applied on a particular output.

12.3.3 Global Settings

The global settings are available on the **Redundancy->Output** page in the GUI and are configured per output module.



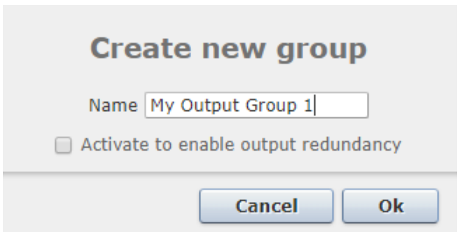
Enable OSPF	Enables OSPF routing – checking this box allows the following parameters to be configured: **OSPF Area**, **MD5 OSPF Authentication**, and **Stubby Area**. OSPF is used to update the routing tables in the routers. The redundancy scheme currently does not support any other routing protocols. Provided PIM is not controlled by the Appear equipment, it is possible to support multiple OSPF neighbours. *This feature requires the output redundancy license.*
OSPF Area	Designated OSPF area

MD5 OSPF Authentication	Check to enable MD5 OSPF authentication. Following are the parameters necessary to configure this feature: • Key Id – secret keyword version • Key – secret keyword *It is possible to have two sets of MD5 keys – the second set is required to change the key in switch modules.*
Stubby Area	Enable this option if the output is connected to a stubby network
OSPF Metric	Defines the cost of this route in the network
Enable PIM	Enable or disable Protocol Independent Multicast (PIM).In a PIM enabled environment, each subnet must have a designated PIM router (PIM DR). Many routers today supports taking the role as the PIM DR and for those cases the PIM should not be enabled in the AppearTV unit. For routers that cannot act as PIM DR the PIM should be enabled in the Appear TV unit. In this case the Appear TV takes over the role as the subnet PIM DR. The ATV PIM DR is signaling its own multicasts only; hence other sources on the same network will be time out and become unavailable. *This feature requires the output redundancy license.*
RP Point	RP Point – Rendezvous point
Enable Mute On Error	Check to enable or disable Mute on Error
Switching delay(s)	Number of seconds to wait before the output is switched to the backup path, in case of errors.

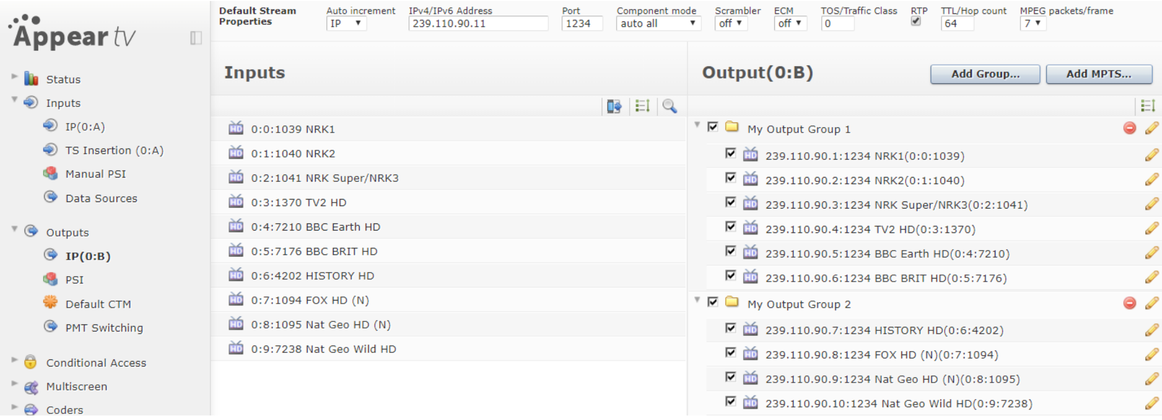
12.3.4 Group streams for output redundancy

User can now create groups in GUI of the IP output card and add services (SPTS) to the groups. Groups can be used just to organize all the outgoing SPTS's, or they can be used for output-redundancy (OSPF) at group level. The output-redundancy behaviour for output groups should be similar to the one in MPTS's.

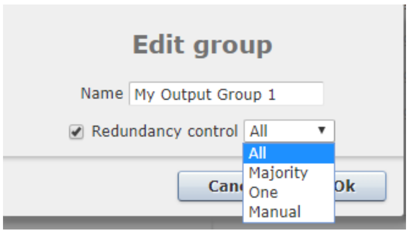
User can define the group manually in the Output configuration GUI, by clicking "Add Group…" button in the top-right part of the window, selecting a Name for the group and clicking "Ok" button.



Then the user can insert members by drag & drop. It is allowed to drag & drop existing outgoing SPTS into a new group too.



The group edit popup should have the following fields:



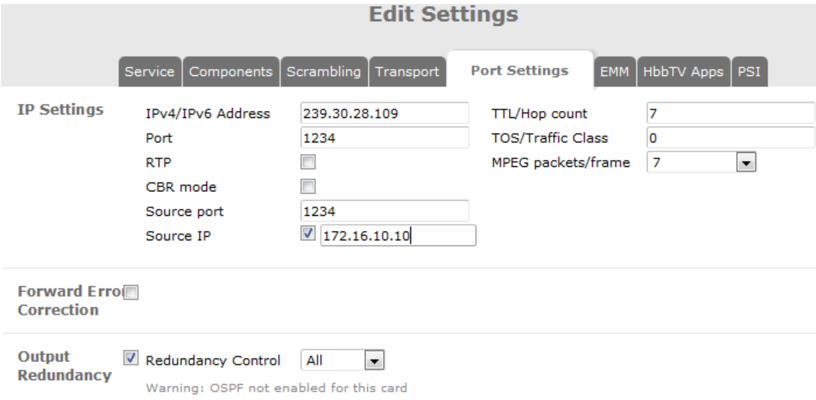
Name	Group Name for GUI presentation purposes only
Redundancy control	Enable if the user wants to use the output group to control Output Redundancy. Choose then one of the following options: **All** – The streams in the group are signaled to be faulty if all of the outgoing services in the group are faulty **Majority** – The streams in the group are signaled to be faulty if the majority of the outgoing services in the group are faulty. **One** – The streams in the group are signaled to be faulty if one of the outgoing services in the group are faulty **Manual** – No automatic operation will occur.

12.3.5 Stream specific settings

When the global redundancy attributes are defined, output redundancy must be enabled for all outgoing streams. When enabled the output redundancy will monitor the stream status and if any errors perform the appropriate action.

Depending on the configuration, the results of an alarm trigger would be:

- Send an OSPF to the next hop router and announces that the source is no longer present.
  - Note that the multicast will still be transmitted.
  - Note that in an multicast system it is the source that is disabled, which means if multiple outputs are given the same source address then both/all streams will be regarded stopped by the router.
- Mute the output, ie 0 bitrate, when 'Mute On Error' is enabled



The **Port Settings** parameters have been described in detail in Section8.3..

The following **Output Redundancy** parameters are available:

Source IP	When OSPF is used the source IP should be defined. If not set then the IP address of the Dataport will be used for all streams. The effect that a single stream failure will disable all sources. The Source IP address set here should correspond to the Source IP address of the other stream source.
Output Redundancy	The output redundancy logic may decide to stop an output due to some conditions. One reason could be that a service failed to be descrambled. If this service is the only service being transmitted on an output the choice is simple: the system can easily just stop the output. On the other hand, if the output is an MPTS containing 10 services, for example. Then the choice is not so simple should one failure result in all 10 services to be stopped on the output. The redundancy control option lets the operator decide which conditions should be met in order for the output to be stopped. Choose one of the following options: **All** – all services must fail **Majority** – only majority services must fail **One** – one service failure is sufficient **None** – automatic redundancy is disabled These switching rules apply to the services with the highest priority ranking within the Output TS. For more information about service priority, refer to the service configuration property page.

12.3.6 Mute on Error

Mute on Error is a form of output redundancy, apart from OSPF, where the output is disabled if there is an error with the input stream. This feature can be used in situations where the equipment receiving the signals require an incoming bitrate of zero (no bitrate), so that a switch to a backup service or input can take place.

To enable or disable Mute on Error, use the check box in the **Edit Redundancy Options** dialog .This feature must also be enabled or disabled for each port on the IP output settings.

The Mute on Error functionality does not require the 'Output Redundancy' license.

i	Enabling Output Redundancy on ASI-Cloned output module and ASI output modules enables Mute on Error by default.

12.4 N+m Module Redundancy

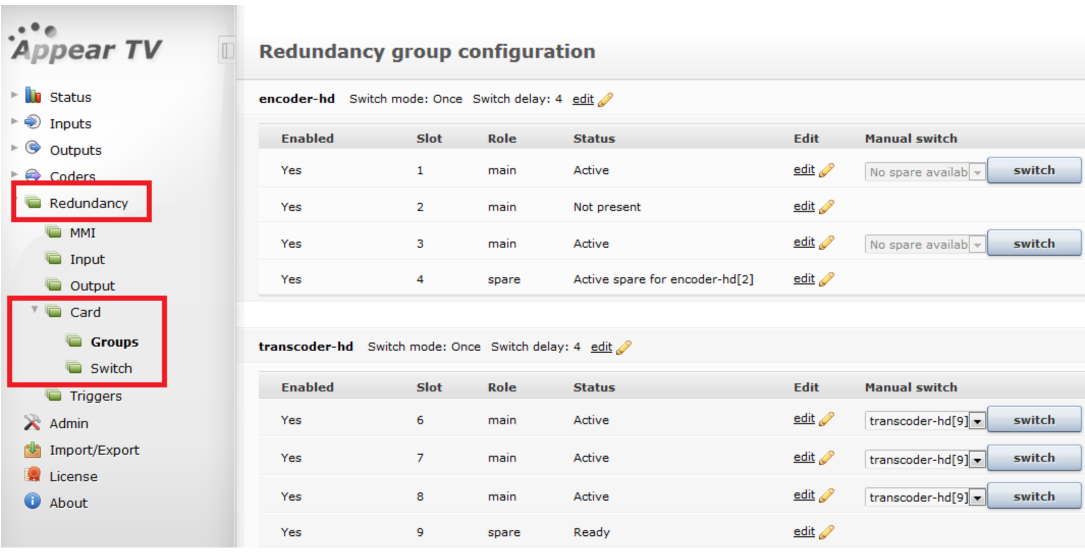
The N+m Module Redundancy protects the system against possible hardware failure for selected card types. Module redundancy is currently supported by the following modules:

- encoder-sd
- encoder-hd
- transcoder-sd
- transcoder-hd
- encoder-cvbs (analog)
- encoder-rf (analog)
- Universal Broadcast Transcoder
- Universal HVQ Transcoder
- Universal Broadcast Encoder
- Universal HVQ Encoder
- Universal Multiscreen Encoder

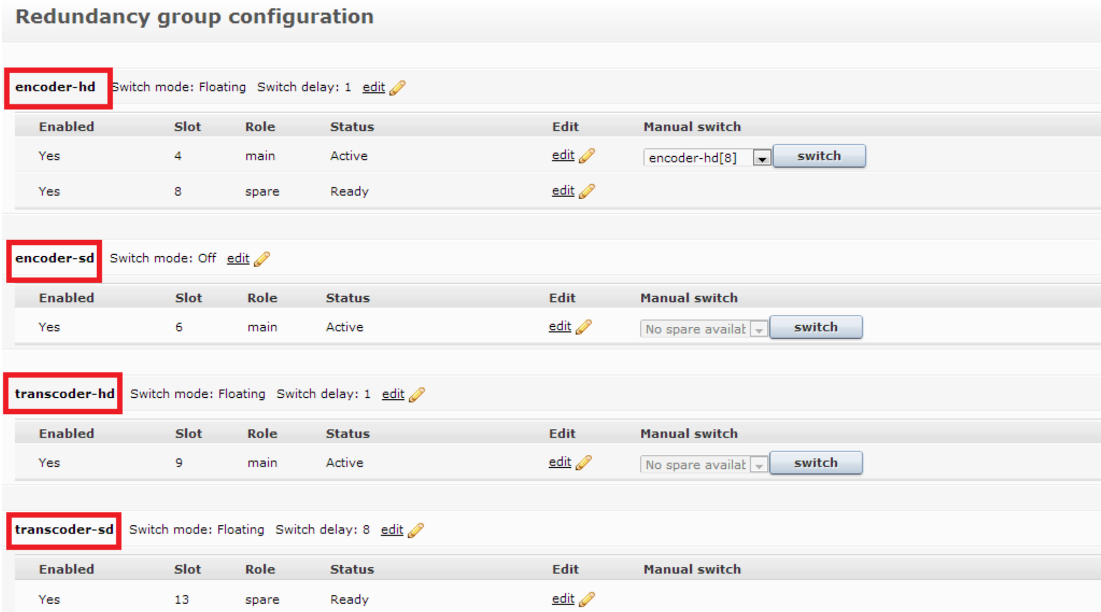
Before the redundancy will take effect the user must specify which cards should be part of a redundancy group and which of them shall be **active/main devices** and which should be **spare devices**.

For the encoder switching an external SDI switch is required. This switch will be configured and managed by the unit hence no external management system is required. For details on supported SDI Switches, please contact the Appear TV Support department.

All redundancy configurations are performed from the **Redundancy->Card** navigation pane. The **Groups** page configures the general group settings while the switch page defines external switches.



The system will automatically populate the internal modules into groups based on the module type. In the figure above it shows the "**encoder-hd**" and "**transcoder-hd"** groups.



12.4.1 Redundancy Group Configuration

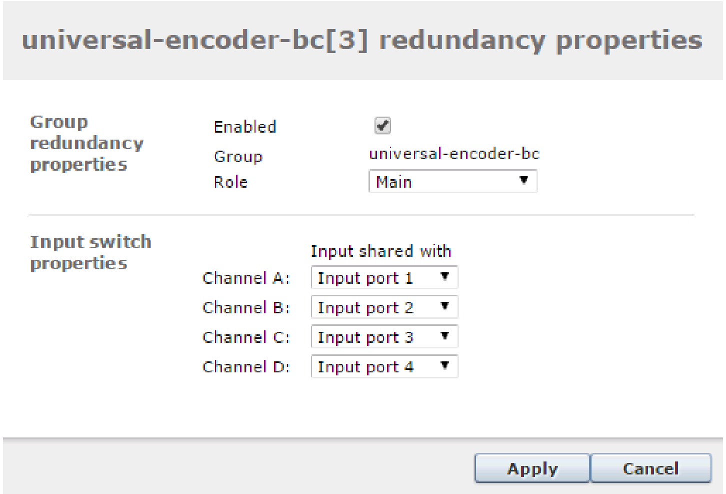
The redundancy group parameters are defined under the **Card->Groups** navigation pane.
To edit the group settings press the edit to the right of the group name.
Following parameters are present under Group setting.

Name	Automatically generated based on card type
Switch mode	Select a suitable mode for each redundancy pair. The following modes are available: **Manual** – No automatic switching. Enable manual operation only **Once** - Switch to backup when alarm is set, only manual operation to revert back to main. **Floating** – Switch when an alarm is set on the active cards, ignore clear alarms **Reverting** – Switch to backup only if there is an alarm on main but not on backup; switch back when alarms on main are removed. This is a purely automatic mode: no manual operation allowed
Switch delay	A delay added when the switch module receives an alarm. If the problem persists after the delay, a card redundancy switch is triggered.
Switch back delay	Specify the Switch back delay (only applies on 'Reverting' mode).
Switch	Select from a list of previously defined SDI switches.

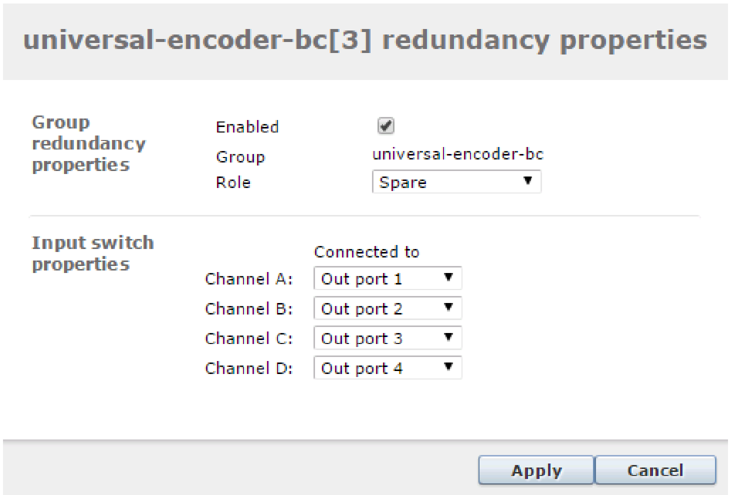
12.4.2 Redundancy Module Configuration

Within the group, the role of each card and for encoder modules and its cabling/SDI Switch configuration must be defined. To edit the group press the **edit** to the right of the card.

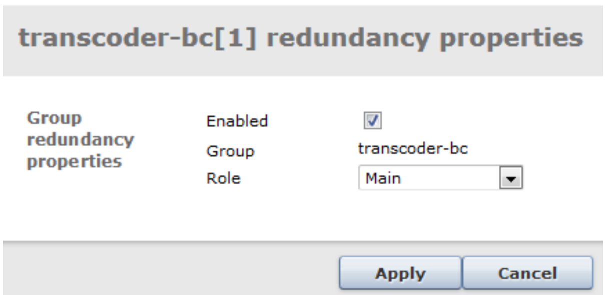
To define a main role, select 'Main' and define which SDI Switch ports the services are available on and which encoder ports they are connected to.

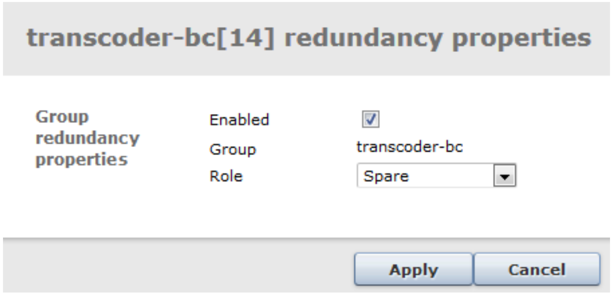


To define a backup module and connection, first select 'Spare' role and define which SDI Switch ports are connected to the encoder ports.



For Transcoder modules, it is only required to define which role the module will have, ie:





Following parameters are present under redundancy properties.

Group redundancy properties-

Enabled	When checked this card is part of the redundancy group.
Role	Either of one: **Main/Spare**

Input switch properties for Main Card-

Channel A/B	This defines which input port on the switch receives the same signal as this port on the card.

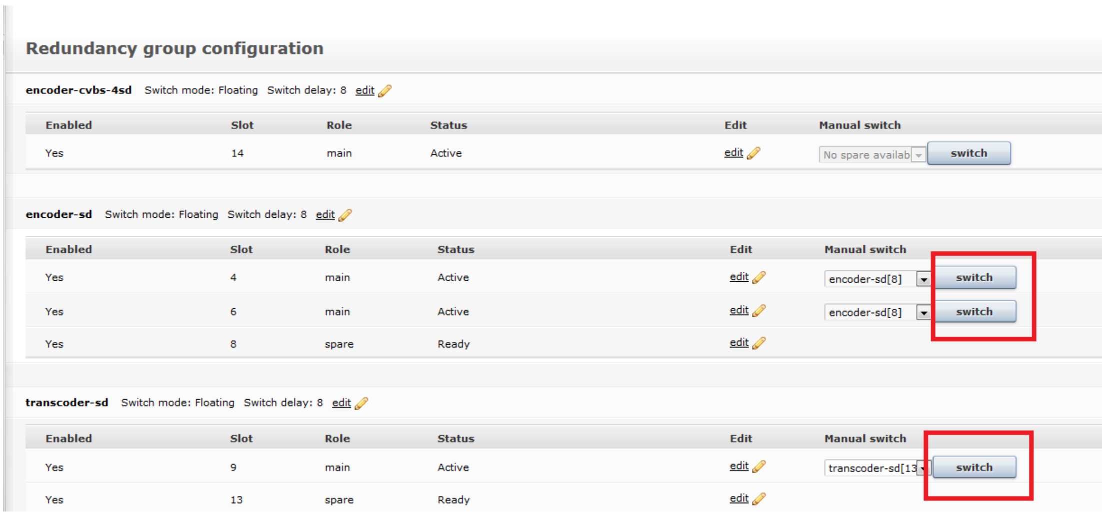
Input switch properties for Spare Card-

Connected to	This is the output port of the switch which is connected to the input port of the spare encoder.

12.4.3 Manual Switching

Manual switching can be performed using the switch button on the Group page. When an input SDI switch is defined the switch will first be configured, and then when the switch is ready the rest of the system will move to the spare unit. If the switch configuration fails then the switch operation will be aborted.

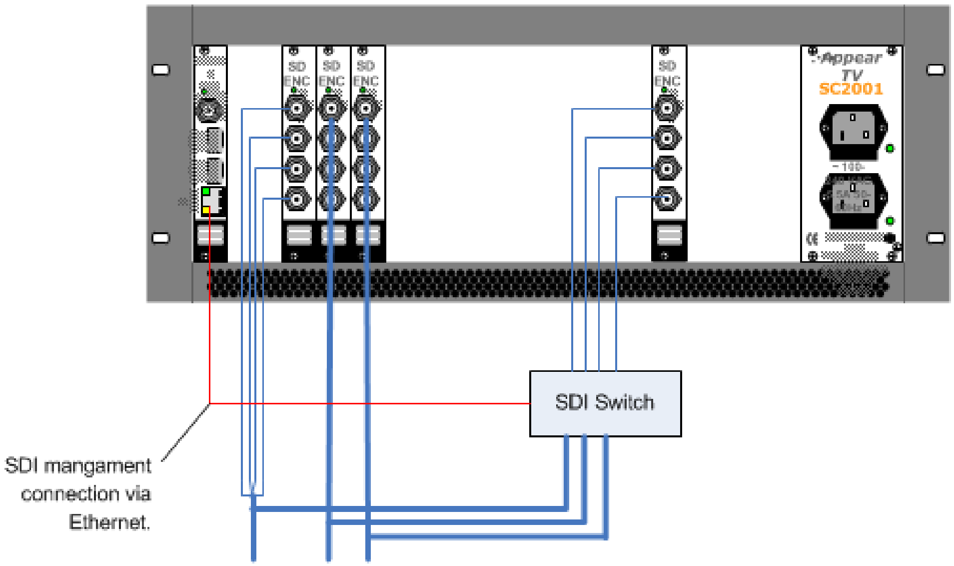
Changes to encoder/transcoder parameters shall always be performed on the main device, even when this device is switched to a spare. The system will automatically redirect any editing of the spare card to the main card when the spare is running as a backup.



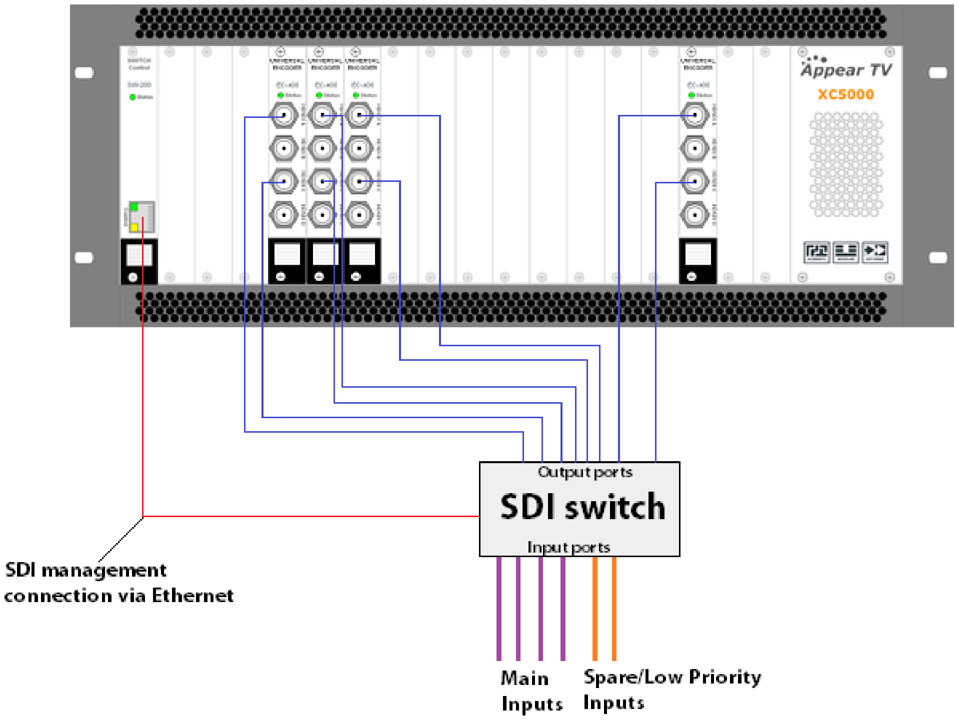
12.4.4 SDI Input switch configuration

The following system topologies are supported for encoder redundancy requiring an external SDI switch.

Main SDI inputs connected directly to source and backup module connected to SDI Switch:

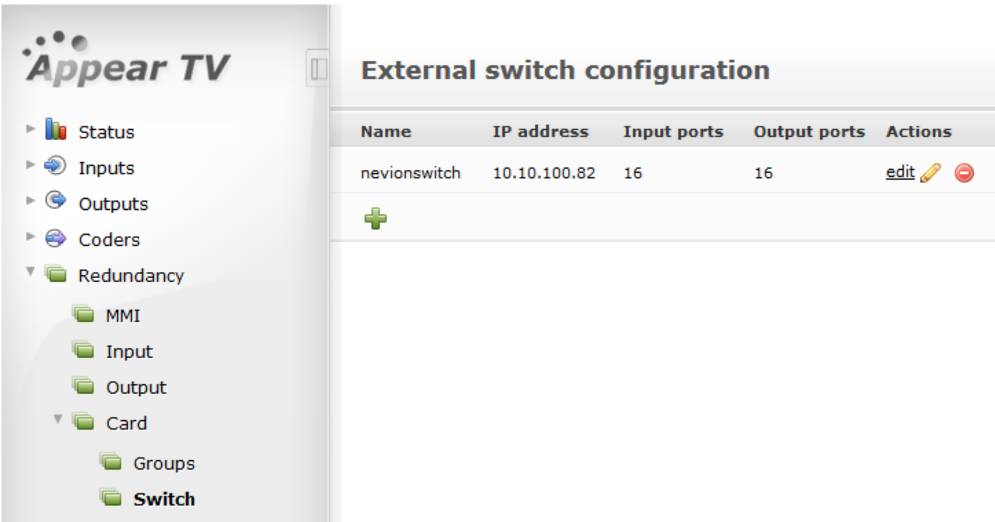


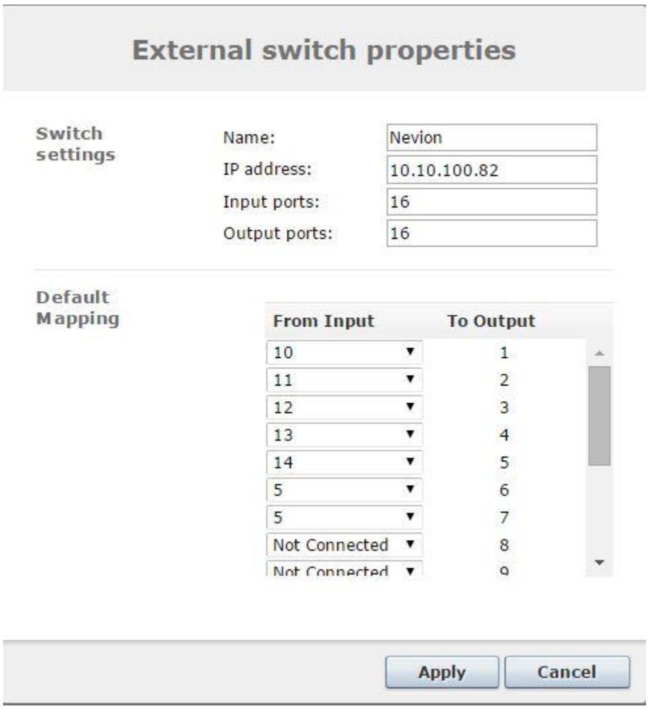
Both main and backup connected to SDI Switch:



The SDI inputs to the main cards can be connected either directly or via the SDI switch (see pictures above), while the input to the spare cards is always connected via the SDI switch.

To add a new switch press the "+" sign and enter the relevant parameters.

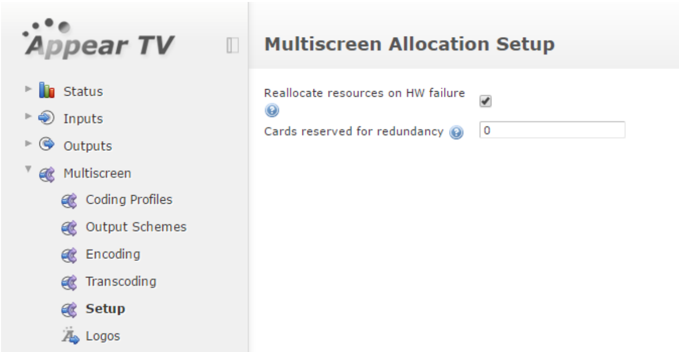




Name	Specify the Name of the Switch.
IP address	Insert the IP address of the SDI switch
Input ports	Specify the number of Input ports.
Output ports	Specify the number of Outputs ports.
Switch Vendor	Nevion or Blackmagic
Default Mapping	Select which input port must be mapped to which output port of the SDI switch. This can be used for both main and spare cards. The mappings to spare cards will be undone when a N+M redundancy switch happens to map the main signal path to the spare card.

12.4.5 Multiscreen Transcoder Configuration

For Multiscreen Transcoders it is possible to define a number of modules to be reserved for redundancy and this can be done on the 'Miltiscreen->Setup' page:



12.5 MMI Redundancy

MMI Redundancy is designed to protect the system from MMI card hardware failures. In case of an MMI card failure the system shall switch to the backup MMI card in slot 17.

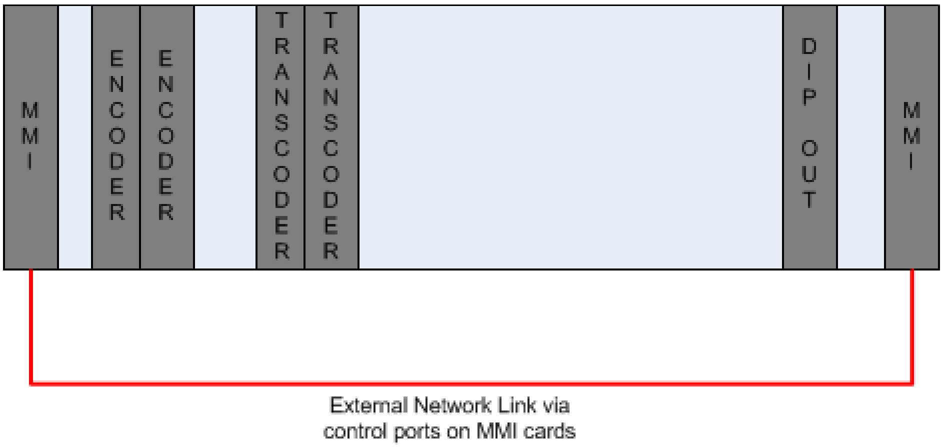
MMI Redundancy will also automatically synchronise the configuration database between the two MMI modules.

The following cards support MMI Redundancy:

- Seamless IP Input
- IP output
- Dual IP Cloned output
- Dual IP Input
- Dual IP T2 Gateway
- Encoder (SD/HD)
- Transcoder (SD/HD)
- ADM
- ASI Output (Bamboo)
- ASI Input (Bamboo)
- Universal Multiscreen Transcoder
- Universal Broadcast Transcoder
- Universal HVQ Transcoder
- Universal Broadcast Encoder
- Universal HVQ Encoder
- Universal Multiscreen Encoder
- DVB-S2X output
- DIP Monitor-In-Out
- DVB-S2X input
- 8VSB input
- EPG (Bamboo)
- Enhanced DVB-S2 input
- ISDB-T input module
- DVB-T2 input module
- SIM bulk Descrambler
- Bulk Descrambler
- Scrambler
- Audio Processor
- QAM Annex B Input module

- DVB-C Input module
- DVB-T2 GW output module
- IP input module
- SRT IP input/output module

The two MMI cards must be able to communicate in order to synchronize the database. Currently this is performed via the external management port on the two MMI cards.

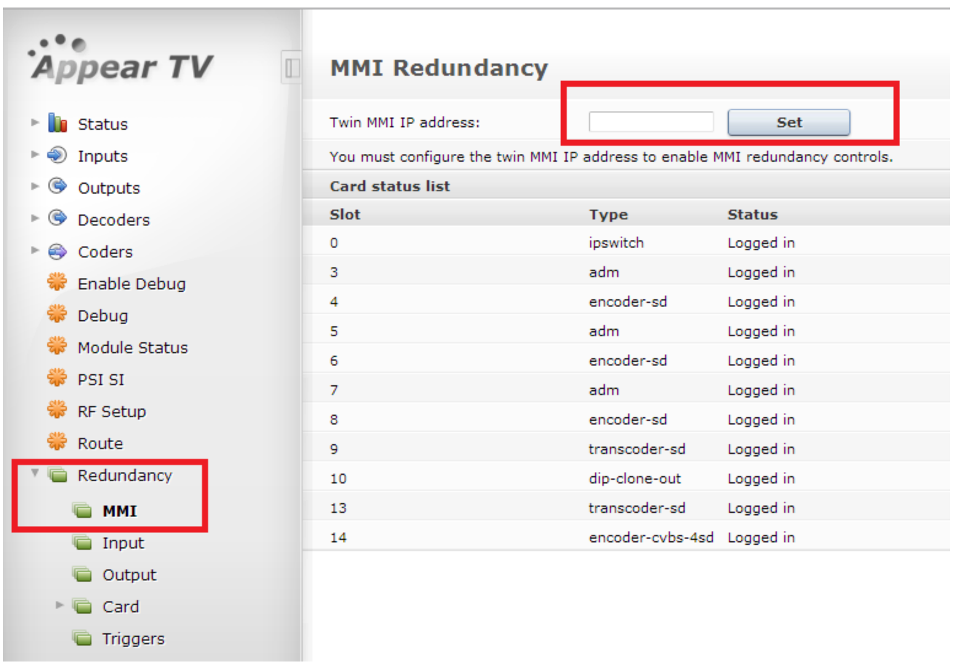


12.5.1 MMI Redundancy Configuration

In order to configure MMI Redundancy, the Switch module must first be changed to this mode. This is configured in the Maintenance Centre and you can find details on this procedure in the Upgrade Guide.

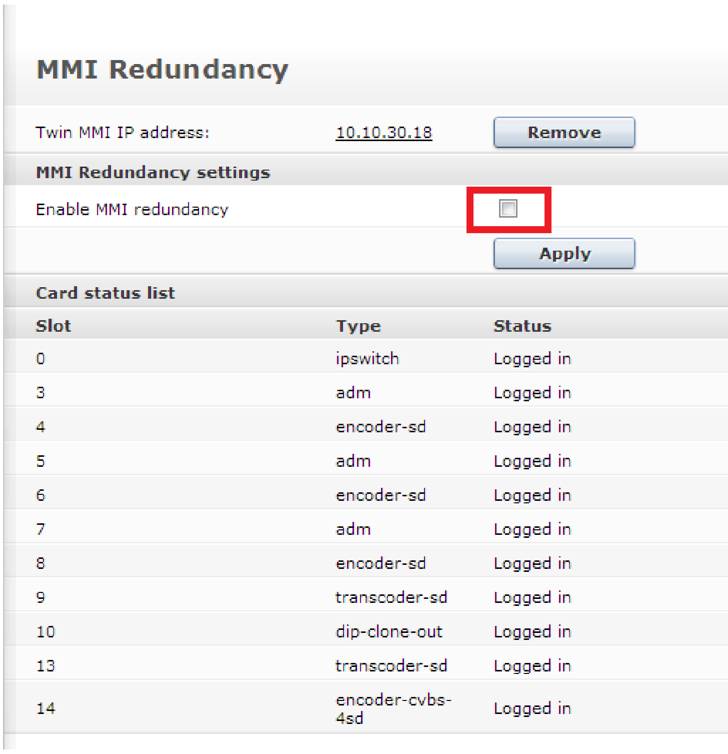
Once configured, the GUI page for MMI Redundancy will replace the Internal Redundancy page. This page will be slightly different depending on which MMI the user is accessing. We will refer as 'Main MMI' for MMI on Slot 0, and 'Backup MMI' for MMI on Slot 17.

The configuration for MMI Redundancy is available under the **Redundancy -> MMI** page in the GUI.



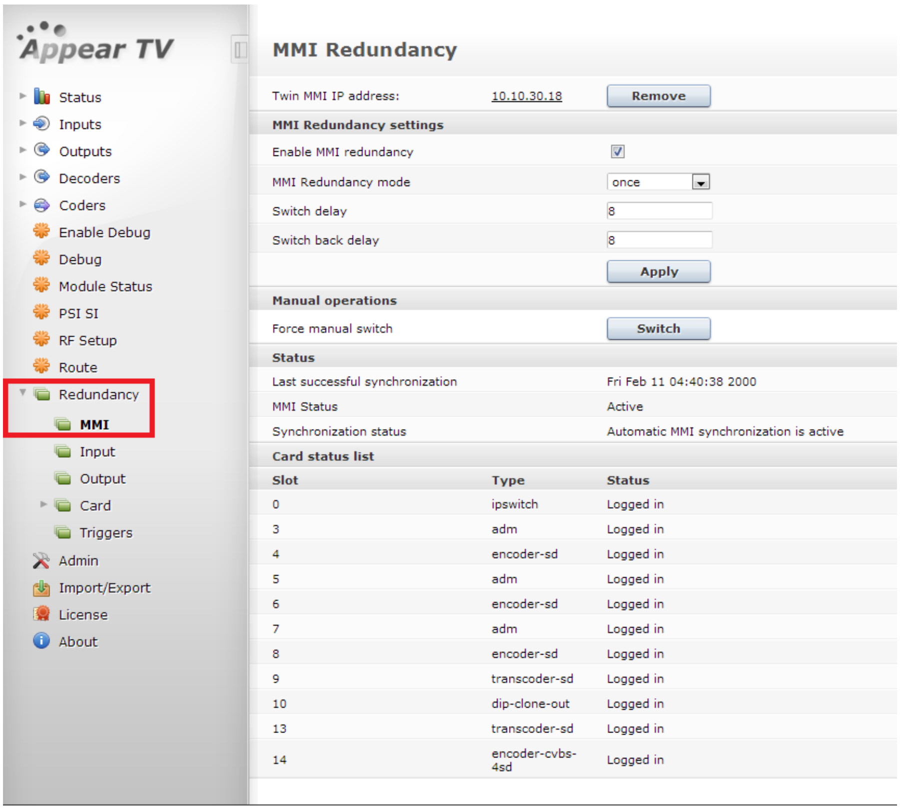
First the twin MMI IP address must be set, as MMI Synchronizer works based on an external Ethernet connection between both MMIs.

The 'Card status list' shows all cards that are currently logged in and their status. After setting twin MMI IP on both MMI modules, you will see the following new rows available for configuration on the main MMI page:



After setting both twin MMI IP addresses, all slave modules will be logged into the same backplane, so this list will show all cards as "Logged in" in one MMI, as "Logged in to twin" in the other MMI.

Finally, after enabling MMI Redundancy, we will get the complete MMI Redundancy GUI page: Main MMI



Following are MMI Redundancy Settings parameters:

Enable	This is the checkbox to enable/disable MMI Redundancy. Enabling means both auto config database synchronization and auto backplane switching for all cards when they lose contact with MMI.
MMI Redundancy mode	Either of one: **Once** or **Reverting**.
Switch delay	This is the delay before a module switches backplane when MMI switch has been triggered. It is not applied when Manual Switch is performed.
Switch back delay	This delay is until now only applied on Reverting mode, working right now only for Alarms trigger.

Following are Manual operations parameters:

Force manual switch	This will perform an immediate MMI switch.

Following are Status parameters:

Last successful synchronization	This shows the time last a synchronization was confirmed.
Last local change	This shows the time last local change in configuration was introduced.
MMI Status	This displays whether the MMI module is currently active or spare.
Synchronization status	Shows the current status: 'Automatic MMI synchronization is active' - Currently no issues 'Unable to automatically synchronize MMI configuration' – Possible issues with synchronization

12.5.2 MMI Switching Criteria

There are three possible triggers that will perform an automatic MMI Switch:

- **Alarms**: There are two alarms which will trigger MMI switch. They can be checked in **'Triggers'** node under **'Redundancy'** tree in the left panel of the GUI, in **'Card redundancy'** for 'switch' card
    - Hardware failure (raised when both dataport links are down)
    - No contact with FPGA
- **Slave modules lose contact with MMI (MMI dead, reboot, upgrading)**: All slave modules monitor the connection to the MMI module and can switch if this is lost. All have been configured to have this logout trigger enabled with the same delay, so they will switch at the same time
- **Manual:** Twin MMI is forced to take over and all cards are switched to the other backplane/MMI.

12.5.3 Configuration Database Synchronization

Database synchronisation will be performed automatically in both directions, ie main MMI -> backup MMI and backup MMI -> main MMI. Immediately after introducing a change in the configuration on either MMI, it will be synced to the twin MMI.

MMI's IP interfaces will never be synchronised, however, the IP addresses of the other interfaces on all slave modules will be synchronized.

12.5.4 Link between MMIs

MMI Redundancy is highly dependent on external link between MMI modules. Link down state is notified to the user as an "Unable to communicate with Twin MMI" critical alarm, and there are important consequences on this feature if the link is down:

- Database synchronisation will not be available. This will be shown on **Synchronization status**.
- The mechanism to enforce all modules to be logged into the same backplane will not work, as each MMI has no information about the other.
- Cards logged into one MMI will not be shown on the other. This will be shown as **'Not present'** and **'Card missing'** alarms.
- No switch will be available as the mechanism to move modules from one side to the other is not working.

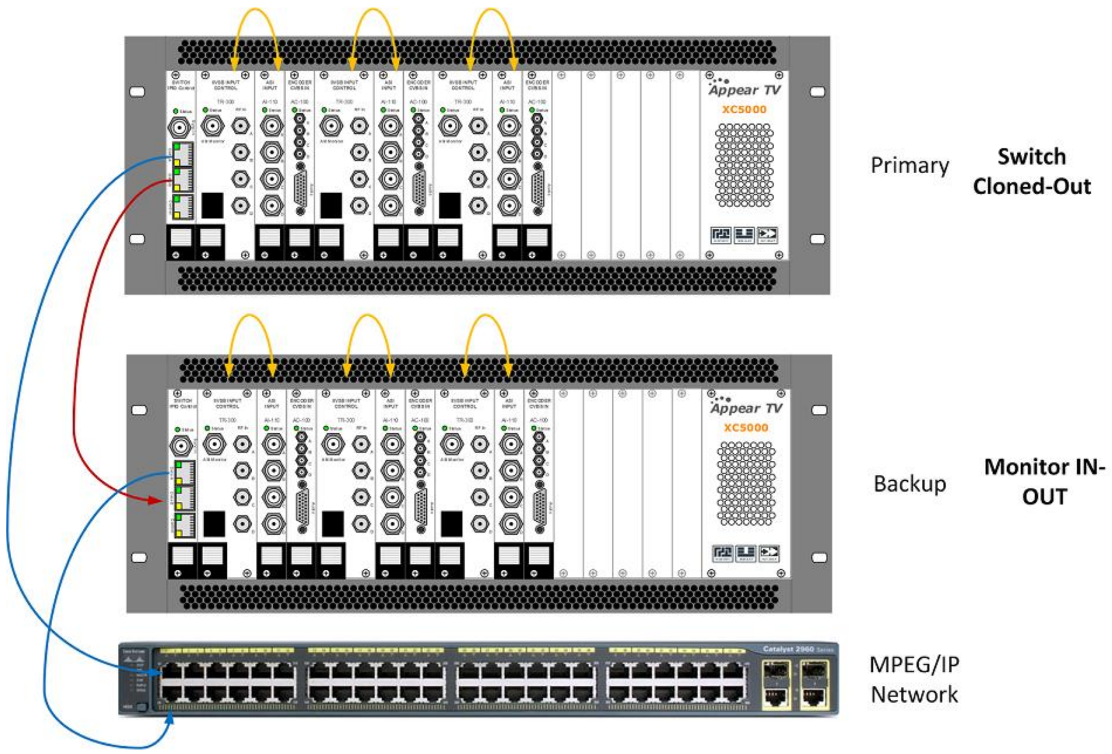
When the link is restored, and Main MMI is running properly, there are two possible situations:

- There is no MMI switch registered, so there is no reason to stay in Backup MMI. All cards will be forced to switch back and Main MMI will be Active again.
- There is a MMI switch registered. This means either manual or automatic (triggered by alarms) MMI switch was performed before losing contact with twin MMI (link down). Depending on the switching mode, a decision will be taken: If 'Once' mode, cards will stay in the second backplane and Backup MMI will be Active; if 'Reverting' mode, cards will be forced to switch back to Main MMI, which will become Active.

12.6 Monitor In/Out Redundancy

The Monitor In/Out Redundancy is designed as an alternative for configurations that require IP output redundancy, but that cannot use OSPF or an Active+Active configuration. This configuration is made up of the primary unit with a Switch+IP module in Cloned IP Output mode and a secondary unit with a Switch+IP in Monitor In/Out mode which monitors the active output from the primary and if in error will activate its outputs.

The configuration of this is as follows



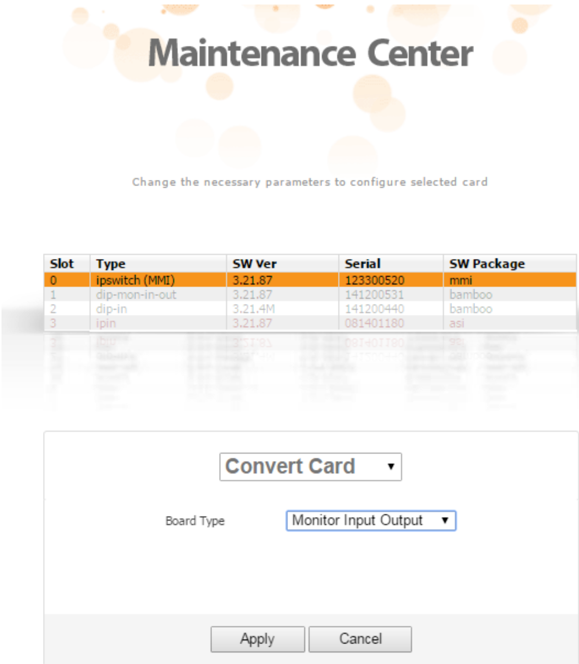
12.6.1 Primary Unit Configuration

The primary units Switch+IP module will be configured in Cloned IP Output mode and have the identical MPEG transport streams on both interfaces.

The primary unit is then required to have configured mute on error for all streams on both ports. See Section 12.3.5 for more information. The output streams will be muted on both ports in case of a failure (input lost, low level etc) and a user initiated failure (manual switch).

12.6.2 Backup Unit Configuration

The primary units Switch+IP module will be configured in Cloned IP Output mode and have the identical MPEG transport streams on both interfaces. This can be configured from the Maintenance Center as such;



For more details on converting module modes, please see the Upgrade Guide.

In this mode, the Switch+IP module will required be configured identically to the primary unit. Port A on the module should be connected to the output of the Primary and this will monitor the streams.

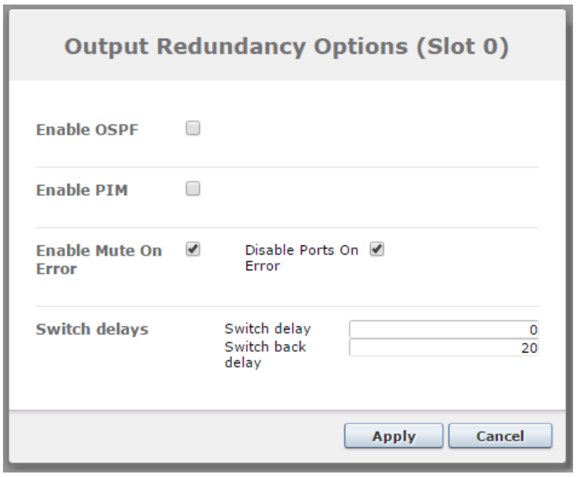
IP Input configuration for Monitor In+Out mode does not support VLAN input sources.

Port B on the module will by default be muted on the output. When a loss of bitrate is detected on a multicast from the Primary unit, the output multicast from the Backup unit will be un-muted. This multicast will continue to be output until there is a return of bitrate from the Primary multicast.

12.6.3 Switching Behavior

By default in an error state where the Backup unit is streaming, when the output streams from the Primary return these will be detected by the Backup and its outputs will return to a muted sate.

If it is required that the Primary continue to be muted when there are no errors present, then it is possible to enable the 'Disable Ports On Error' option found under the **Redundancy->Output** menu for this module in the GUI:

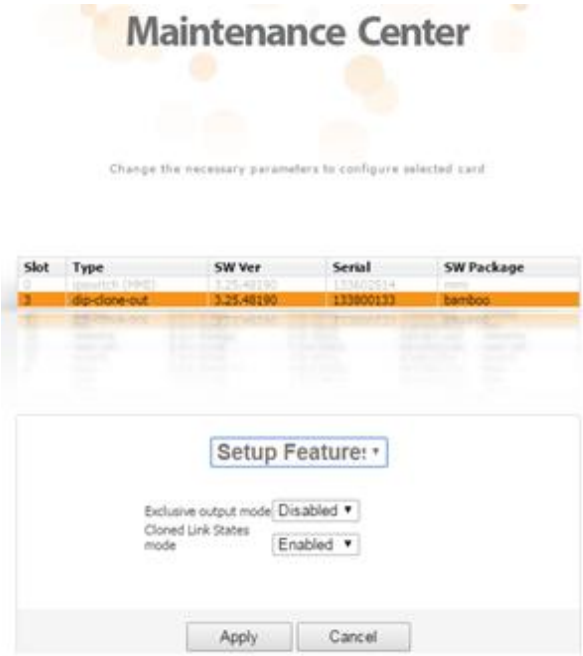


To clear this state, the Primary will have its sources manually enabled again. Until this is performed, the backup multicast will continue to stream.

12.6.4 Cloned Link State Mode

To correspond with the Backup MMI being configured in Monitor In+Out mode, it is also possible to configure the Main MMI in Cloned Link State mode. When in this mode, if there is a port link error on Port A, ie main distribution output, then the system will also force a link down on Port B, ie output feeding the backup unit. This will then have the effect that the backup unit will begin to transmit.

This can be configured from the Maintenance Center as such;



i	It is not possible to enable both Exclusive output mode and Cloned Link State mode at the same time.

12.7 Conditional Access (CA) Redundancy

The unit supports CA redundancy, in other words, ECMG and EMMG redundancy. The difference between ECMG and EMMG redundancy is that ECMG redundancy is actively controlled by the unit, whereas EMMG redundancy is simply allowing for multiple EMMG IP addresses to connect to the same port.

12.7.1 ECMG Redundancy

ECMG redundancy involves two ECMGs: one Main and the other Backup. If the connection to the Main ECMG is lost, the multiplexer will automatically switch to the Backup ECMG based on the configuration defined in the GUI.

ECMs cannot be defined specifically for the Backup ECMG; instead they are automatically generated according to those defined for the Main ECMG.

In terms of **alarms**:

When the connection to the Main ECMG is lost, a warning alarm will be displayed in the GUI.

When the multiplexer switches to the Backup ECMG, the earlier warning alarm disappears; it is replaced with another alarm indicating that a switch has occurred.

Connection to the Backup ECMG is only established at the time of switching. In other words, if the Backup ECMG fails while the Main ECMG is still running, no alarm will be triggered.

i	Switching between the Main ECMG and Backup ECMG does not affect the service as the CW will not be changed in the stream until a new ECM is received from the ECMG.

12.7.2 Redundancy Configuration

A redundancy rule for ECMGs can be defined from the **Redundancy → CA** tab in the **Navigation Pane**. Insert appropriate values here and click **Add**.

Before defining the rule, it is necessary to define the Main ECMG from **Conditional Access → SCS → ECMG**.

The following information is displayed:

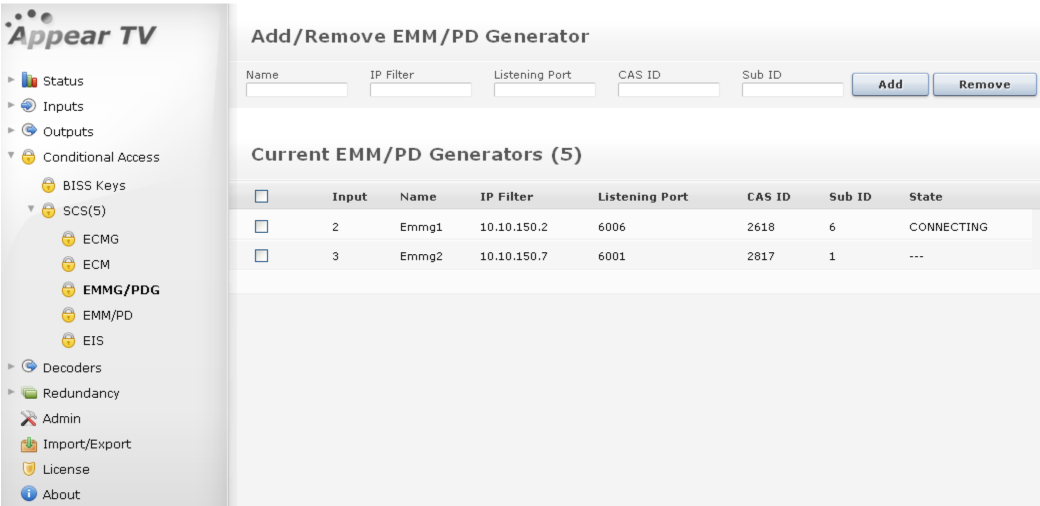
IP	Backup ECMG's IP address
Port	Backup ECMG's TCP port
Channel	SimulCrypt channel ID for the Backup ECMG
CAS Sub Id	CA vendor specific Sub ID

12.7.3 Manual Switching

Based on the figure above, click **Switch**. The **State** value (Running, Sleeping) should change accordingly.

12.7.4 EMMG Redundancy

When defining the EMMG, it is possible to state its IP address, otherwise known as **IP Filter**. Specifying an IP filter prevents unknown EMMGs from connecting to the Scrambler module.



However, it is not compulsory to add this **IP Filter**. Using the value *0.0.0.0* ensures that the EMMG connection will not validate the Source IP address (of the EMMG). In addition, multiple sources may connect to the same listening port, but <u>not</u> concurrently.

If a Main and a Backup EMMG are present in the system, the first EMMG to connect will be the active one. A connection from the second unit will be rejected as long as an EMMG is currently active.

i	It is not possible to manually switch the EMMGs as this connection controlled by the EMMG itself.

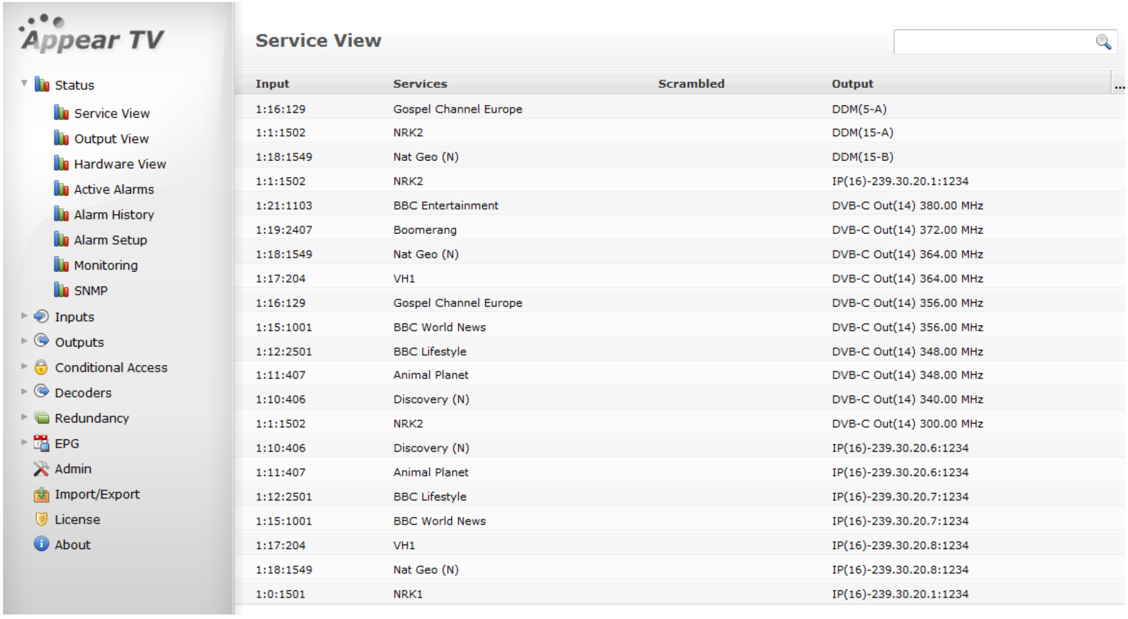
13 Control And Monitoring

13.1 System Status

The system status of the unit can be monitored easily from the web GUI's **Status** node. Information regarding services currently configured, active alarms, alarm history, etc. can be found here.

13.1.1 Service View

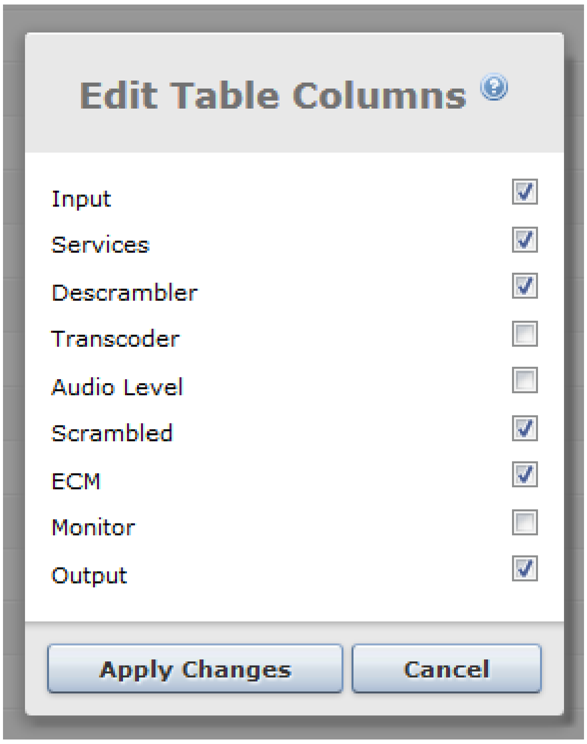
Expand the **Status** node in the **Navigation Pane** and click on the **Service View** node. The **Service View** will be displayed as shown below.



Information in the **Service View** can be sorted by clicking on the column headers. It is possible to search within this page by using the field with the magnifying glass in the top right corner. The **Service View** shows all configured services by default and the following information is available:

Input	Input information about the corresponding service. The notation is <X:Y:Z> where: • X – input module's slot position • Y – input module's port • Z – service PID
Service	Name of the output service
Scramble	Scrambler card assigned
Output	Output information about the corresponding service. The notation is <X:Y:Z> where: • X – output module's slot position • Y – output module's port • Z – service PID

It is possible to select and deselect information in this view by clicking on the '**...**' in the top right hand corner of the title bar. This will bring up the following dialog:

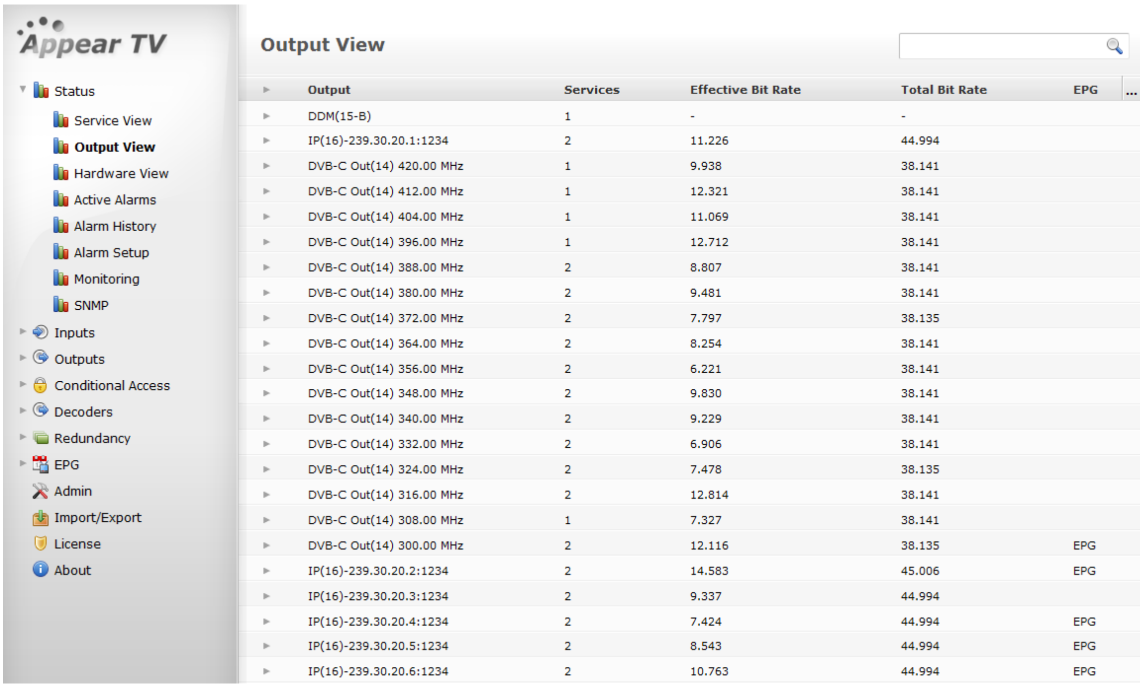


In this list, it is possible to sort the options by dragging the line to the desired location. The optional information available is described below:

Descramber	Descrambler module assigned. The notation is <X:Y> where: • X – descrambler module's slot position • Y – descrambler module's Common Interface (CI) slot
Transcoder	Transcoder module/port assigned to the service
Audio Level	Audio leveling module assigned to the channel
ECM	ECM defined
Monitor	Monitor module used for monitoring the service

13.1.2 Output View

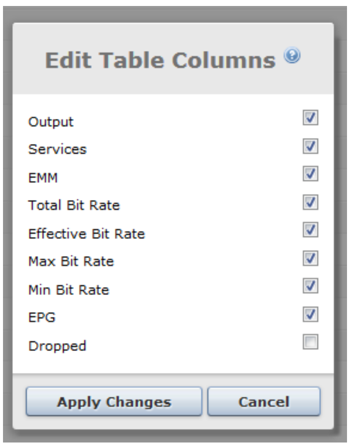
Expand the **Status** node in the **Navigation Pane** and click on the **Output View** node. The **Output View** will be displayed as shown below.



Information in the **Output View** can be sorted by clicking on the column headers. It is possible to search within this page by using the field with the magnifying glass in the top right corner. The **Output View** shows all configured outputs by default and the following information is available:

Output	Information about the output port. This will be specific to the type of output, ie IP will include multicast address, QAM will include frequency.
Services	Lists the number of services in the given output port
Effective Bit Rate	Shows the current effective bitrate of the output port
Total Bit Rate	Shows the current total bitrate configured for the output port
EPG	Displays if there is currently EPG information (EPG Schedule) configured on the output port

It is possible to select and deselect information in this view by clicking on the '…' in the top right hand corner of the title bar. This will bring up the following dialog:

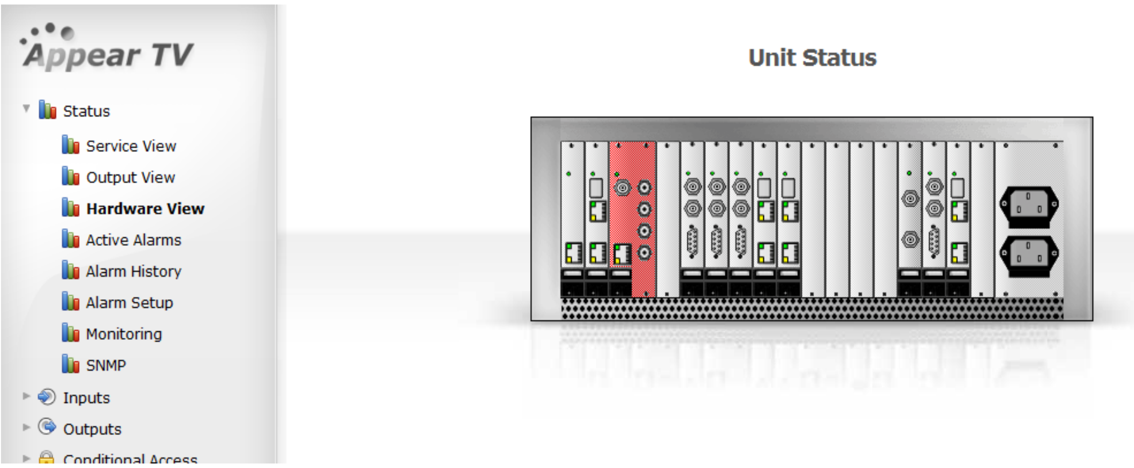


In this list, it is possible to sort the options by dragging the line to the desired location. The optional information available is described below:

EMM	EMM defined on the output port
Max Bit Rate	Maximum bitrate of the output port
Min Bit Rate	Minimum bitrate of the output port
Dropped	Counter for packets dropped by the interface in overflow situations

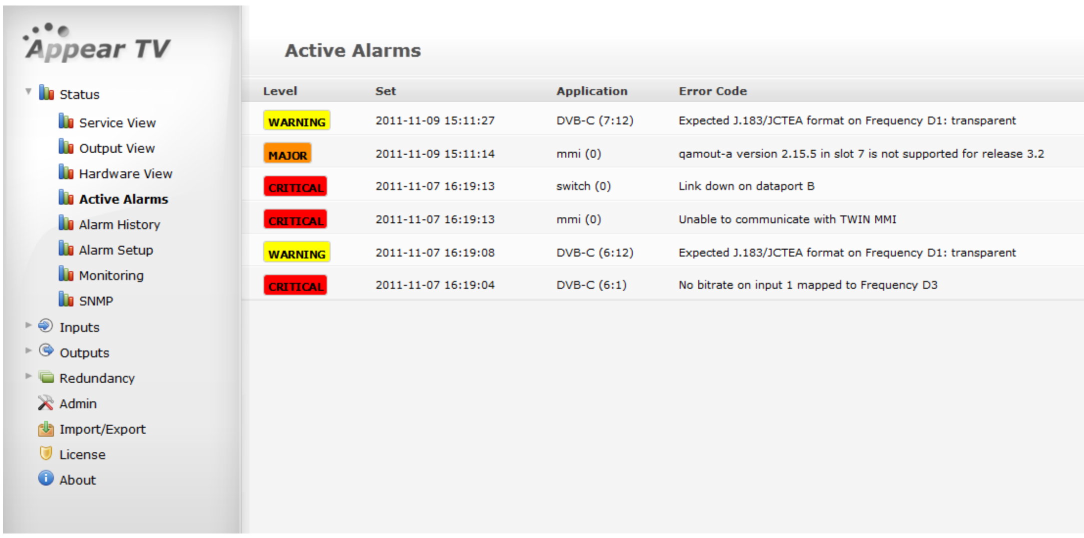
13.1.3 Hardware View

The hardware view shows the unit's status graphically. In the figure below there is one module with critical alarm status, shown in red. A description of the alarm status is shown in the status pane at the bottom of the screen.



13.1.4 Active Alarms

Expand the Status view in the **Navigation Pane** and click the **Active Alarms** icon. All active alarms will be displayed as shown below. The active alarms are first filtered by the active alarms filter, then by the root cause filter, if enabled. Note that all active alarms will also be displayed in the bottom pane. Refer to the table below for information on the color coding and what it represents.



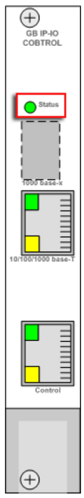
Level	All alarm levels are color coded as follows: • **CRITICAL** – Red • **MAJOR** – Orange • **WARNING** – Yellow • **NOTE** – White
Set	When the alarm was set
Application	Which module and port the alarm is referring to
Error Code	Type of alarm. Refer to Appendix A for further details.

On the module itself, the **Status** LED changes color according to the active alarm:

BLUE – Booting or No contact to backplane

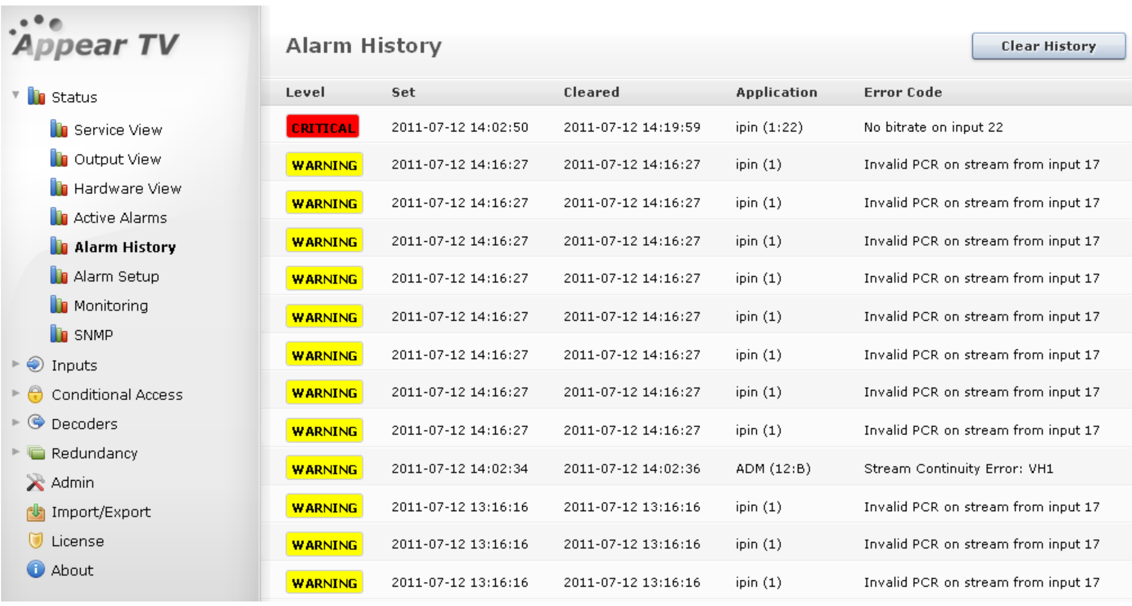
GREEN – No critical alarm(s)

RED – Critical alarm(s)



13.1.5 Alarm History

Expand the Status view in the **Navigation Pane** and select. The alarm history will be displayed as shown below. **Alarm History**



Level	Set	Cleared	Application	Error Code
CRITICAL	2011-07-12 14:02:50	2011-07-12 14:19:59	ipin (1:22)	No bitrate on input 22
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:16:27	2011-07-12 14:16:27	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 14:02:34	2011-07-12 14:02:36	ADM (12:B)	Stream Continuity Error: VH1
WARNING	2011-07-12 13:16:16	2011-07-12 13:16:16	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 13:16:16	2011-07-12 13:16:16	ipin (1)	Invalid PCR on stream from input 17
WARNING	2011-07-12 13:16:16	2011-07-12 13:16:16	ipin (1)	Invalid PCR on stream from input 17

13.1.6 Alarm Setup

The alarm setup feature enables operators to customize their alarms either by setting a preferred severity (overriding the default level of severity) or filtering the alarm.

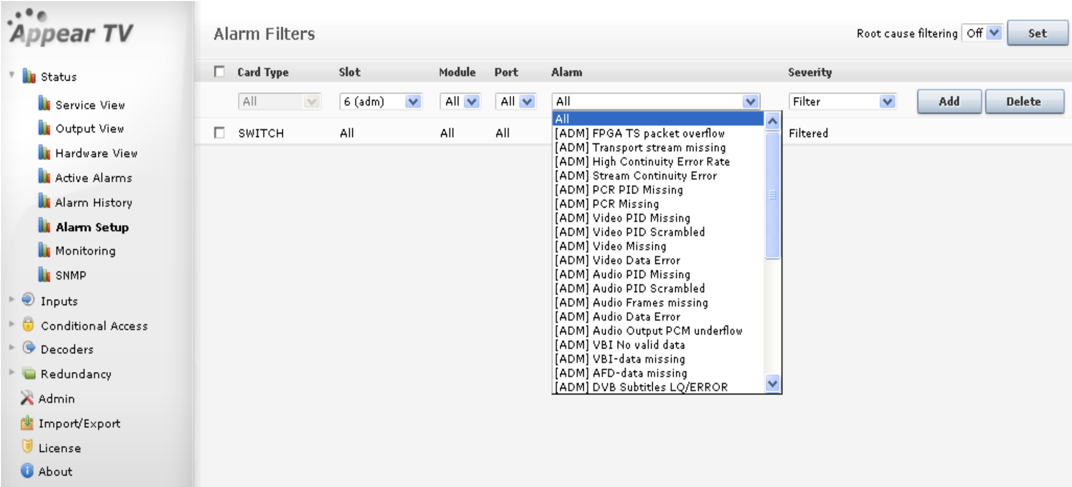
Slot	Lists all modules with their corresponding slot numbers in brackets
Port	Allows for selection of a particular port, depending on the module selected under **Slot**.
Alarm	Lists all possible alarms for the selected module in **Slot**. These alarms are all registered by each module in the system. If no specific module is selected, all alarms are listed.
Action	There are five possible options here: • **Set severity: Notify** – Overrides the alarm's default severity to Notify • **Set Severity: Warning** – Overrides the alarm's default severity to Warning • **Set Severity: Major** – Overrides the alarm's default severity to Major • **Set Severity: Critical** – Overrides the alarm's default severity to Critical • **Filter** – Filtering is based on slot, port and alarm type. If an incoming alarm does not pass the filter, the alarm is discarded. In other words, the alarm is not visible in the **Active Alarms** node, not recorded in **Alarm History**, and not indicated on the LED of the module itself.

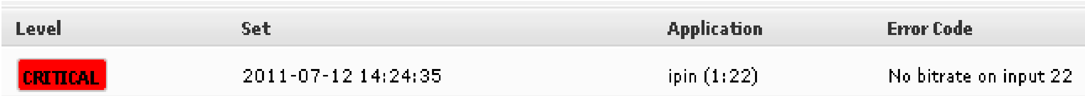
The alarm filter page lists all the relevant alarms for the card type selected (if no specific card is selected all alarms are listed). When an alarm filter is removed any active alarms which are filtered will re-appear with the timestamp according to when the filter was removed.

The alarms shown in the alarm drop down list are all alarms registered by each module in the system. A module is most often represented by a card. From the below list the ADM module equals an ADM decoder card. When an alarm is raised by the respective module detecting an error condition it is possible for the module reporting the alarm to override the alarm description, in order to add some extra information.

In some cases, this may cause the alarm text displayed in the alarm filter not to match the actual alarm text; but it should be obvious which alarm it is.

i	The Alarm Filter also applies for the SNMP trap system.





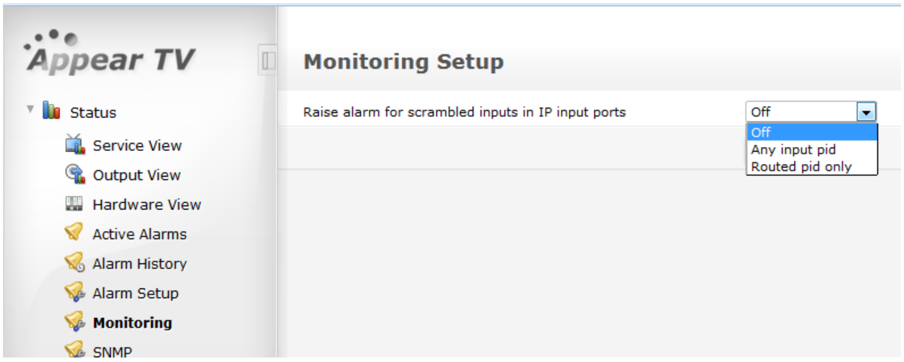
13.1.7 Root Cause Filter

The root cause filter removes alarms which are caused by alarms earlier in the streams, hence eliminating distracting alarms. It is turned on and off in the **Alarm Setup** page.

13.1.8 Monitoring

13.1.8.1 Scrambled Input

Raise alarm for scrambled inputs in IP input ports in below of following condition selected by user.

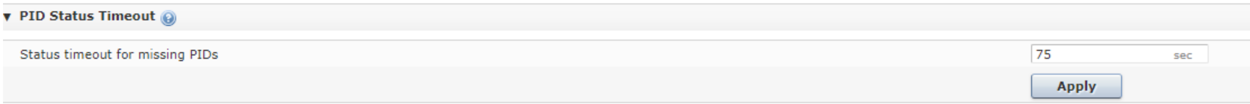


These are the following options supported:

Off	Never raise the alarm
Any input PID	Raise alarm if any of the PIDs are scrambled at the input
Routed PID only	Rise alarm if any of the PIDs are scrambled at the input

13.1.8.2 PID Status Timeout

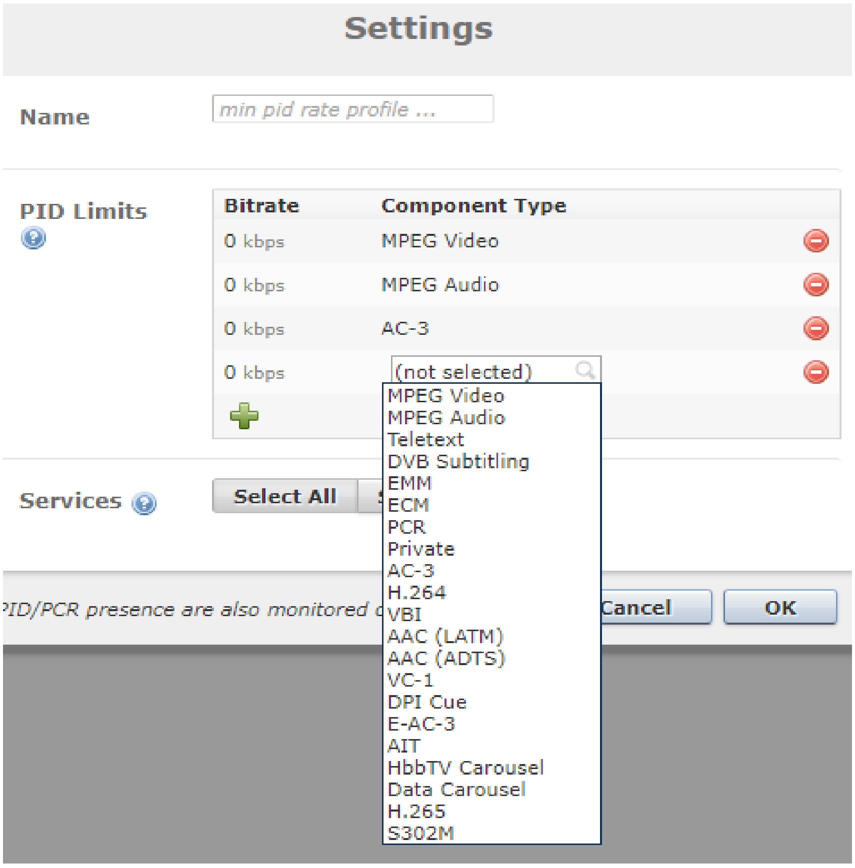
This option allows you to specify the timeout for the 'PID missing' alar in seconds.

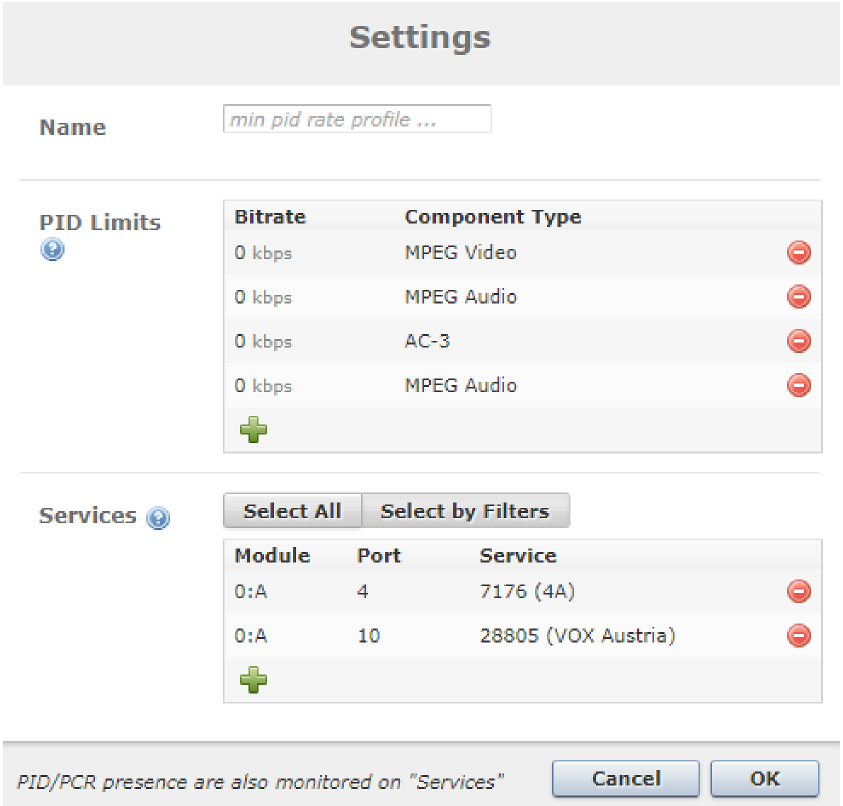


13.1.8.3 Service Monitoring

This feature allows you to configure a bitrate limit for monitoring input component types (eg MPEG Video, H.264, Audio, etc). Services that are selected to use the filter will raise an alarm if any of their monitored components drops below the configured bitrate threshold.

A service level profile is configured in three steps:





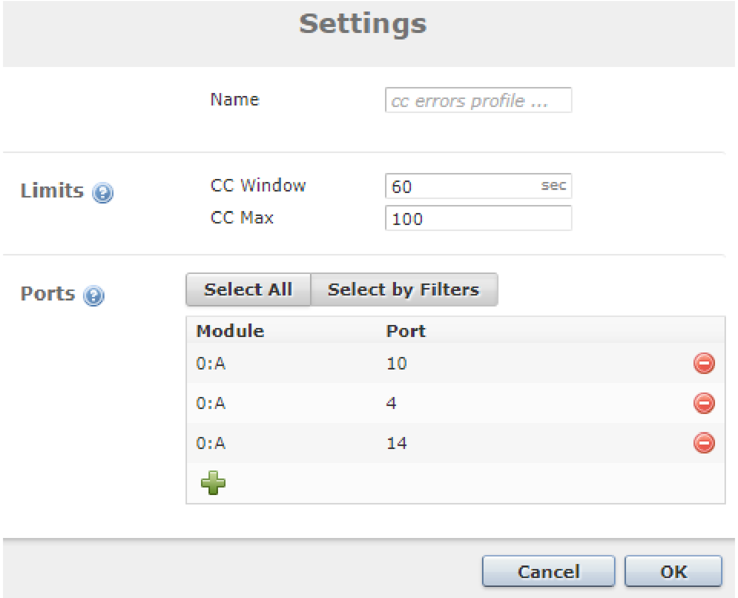
Below are the parameters for setting up Service Monitoring configuration

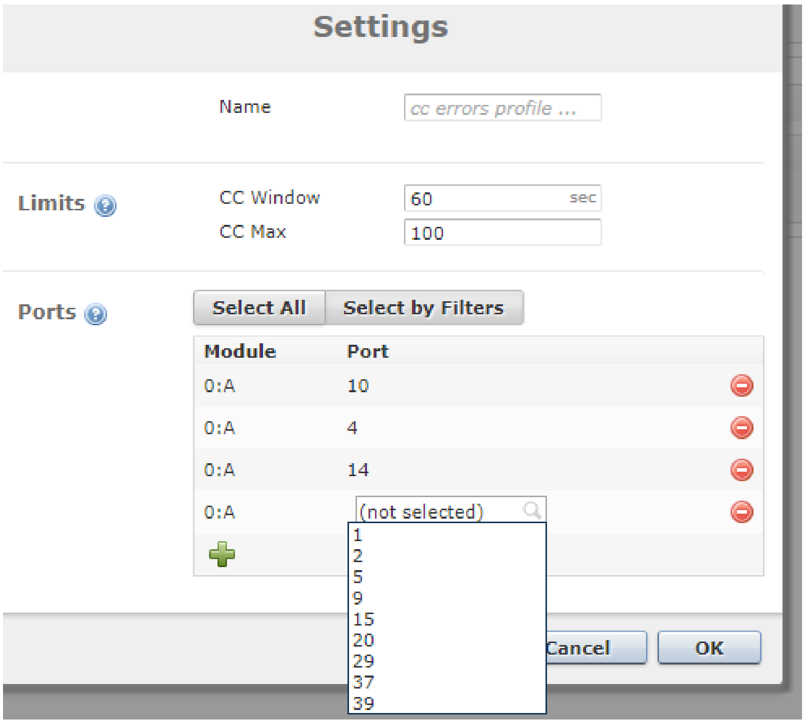
Name	Name of the monitoring profile. If no name is given, a default name is given. A profile must have a name.
PID Limits	PID limits rules can be added for various component types from the drop down list. Multiple rules can be added per profile.
Services	Services to apply the monitoring criteria of PID Limits, (as well as PCR/PID presence), are specified. If no other profiles are set up, the default is to monitor all services. The system allows a service to be monitored by only one profile. If a service has been set up for monitoring in one profile, it will not be available as an option in the other profiles

13.1.8.4 Port Monitoring

This feature allows you to enable CC error monitoring on a port. Once configured with a CC Error limit and time limit (in seconds), the monitored ports will raise an alarm if this limit is exceeded.

A service level profile is configured in three steps:





Below are the parameters for setting up Port Monitoring configuration

Name	Name of the profile. If no name is given, a default name is given. A profile must have a name.

Limits has two parameters to be specified

CC Window	Specify the time window of which to accumulate CC Errors in seconds. This value is recommended to be 60 seconds or greater.
CC Max	Specify the maximum number of CC Errors in this time window

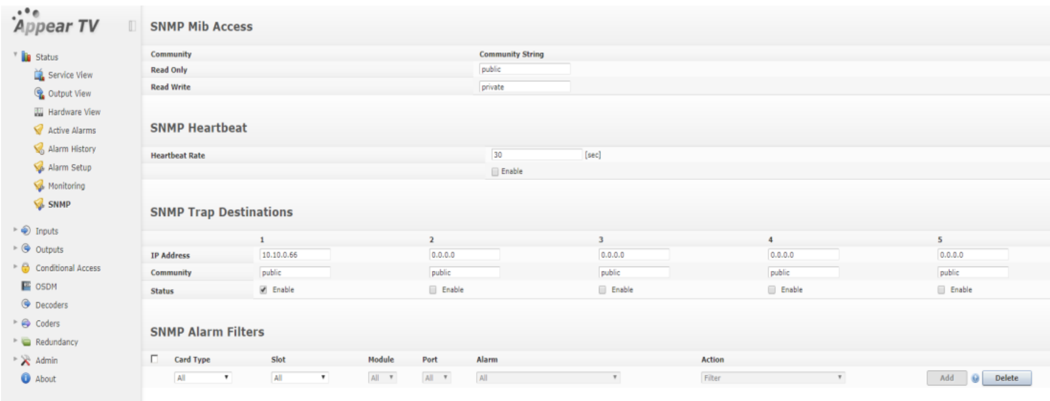
Port has two options

Ports	The system allows a port to be monitored by only one profile. If a port has been set up for monitoring in one profile, it will not be available as an option in the other profiles. Writing it in manually in other profiles nevertheless, the filter will be ignored.

13.2 SNMP

The SNMP agent is located on the MMI module, and uses the same IP address. A number of variables can be configured, including the SNMP configuration file (containing the public and private community strings, for user access and alarms); and the trap destination table. This is explained below.

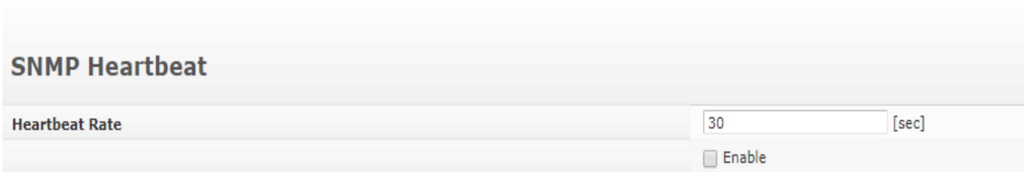
13.2.1 Configuration of SNMP Community Strings in GUI



The SNMP Mib Access is configurable in GUI which containing the public and private community strings, for Read only and Read write community.

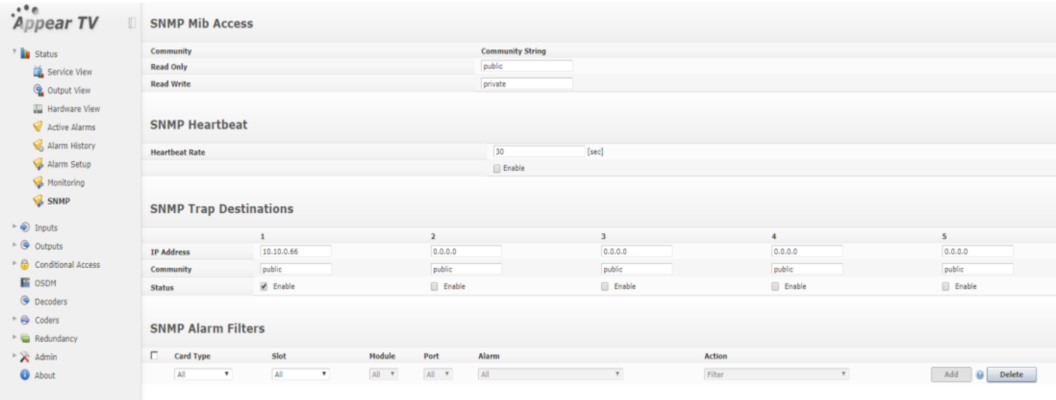
13.2.2 Configuration of SNMP Heartbeat rate in GUI

The SNMP heartbeat rate can be enabled in GUI and this trap is sent out every n seconds where n can specified in the GUI.



13.2.3 Configuration of SNMP Alarm Filter via the GUI

The ordinary alarm filter and the root cause filter is before the SNMP filter, and any alarms which are filtered away by those mechanisms, and hence are not shown in the active alarm list, are never sent via SNMP.



The SNMP alarm filter provides filtering based on slot, port and alarm ID, like the Alarm Setup before it, and it is operated the same way.

13.2.4 Configuration of SNMP Trap Destination Table via the GUI

Five different trap destinations are set in the GUI. After changing status, or IP address or community, press **Apply** to start forwarding alarms.

13.2.5 Configuration of Trap Destination Table via SNMP

The trap destination table must be edited to receive traps. It has five entries, hence allowing five different trap destinations to be used at the same time. Additional rows cannot be created. The tdIpAddr field contains the IP address of the NMS, while the tdRowStatus field is used to determine whether traps should be forwarded. To enable traps towards a specified address the corresponding tdRowStatus field must be set to active (1). To disable traps, set the tdRowStatus field to notInUse (2). Errors are reported when trying to send traffic towards IP address 0.0.0.0, which is the default IP address.

13.2.6 Interpretation of Traps

Each trap is uniquely identified with the combination of msgId, msgSlot, msgPort, and msgInstance fields. The type of error is specified with the msgId field, while the location is specified with the rest, where the msgSlot field is the slot, msgPort is the port on the slot, while the msgInstance field is used when further differentiation is necessary.

The other fields correspond to the fields in the GUI: the msgSeverity field to Level, the msgSourceName field to Application, the msgText field to Error Code, and the msgGenerationTime field to Set.

i	For more information on using the SNMP agent, refer to the **SNMP Integration Guide**.

13.3 SOAP XML Interface

The SOAP XML interface can be used for external control and monitoring of the unit. For more information on the SOAP XML interface, refer to the **AppearTV SOAP XML API** document.

14 Maintenance

This chapter describes how to perform maintenance tasks such as software upgrades, replacing faulty modules, etc.

14.1 Software Upgrades

Software can be uploaded to the unit remotely using the Maintenance Center (MC) available on port 8088 of the unit, ie http://<ip_addr>:8088/. Refer to the **Upgrade Guide** for details.

Required software upgrades for the units will be provided together with instructions by Appear TV's support department.

For more details on the upgrade procedure, please refer to the Upgrade Guide document.

14.2 Hot-Swapping

The platform supports module hot-swapping, i.e. the different modules – power supply, fan, decoder, input, or switch – can be replaced when the head-end is in operation, without shutting it down. In other words, removing a module and replacing it with a new one will not damage the module. The effects of hot-swapping a module are explained in further detail in the following sections.

14.2.1 Performing a Hot-Swap

To remove a module, first loosen the screws on the top and bottom (one screw is located in the ejector). Next, press the white button inside the module ejector and push the ejector down. The module is now released from the chassis.

To insert a new module into the chassis, it is important to align the module's edges with the module-guides in the chassis. Ensure that the jack on the module is in the open position as illustrated in the figure below. Slide the module into the unit on the module-guides until the jack touches the chassis. Move the jack upwards. This will insert the module all the way into the unit.

14.2.2 Switch+MMI Module Hot-swap

This module manages all the other modules in the unit and stores all configuration information in a database. Replacing the Switch+MMI card will cause all services to stop. Hence replacement of the MMI board must be performed with care, and a full backup of the configuration database is recommended.

All communication between different modules in the unit is facilitated by the switch-module; removing this module will disable all backplane communication resulting in loss of all services (the color of the status LED on the modules will change to blue).

Once a replacement switch card is inserted into the device the LED will change back to red or green and services will resume automatically.

Figure 14.1 - A Module with its Ejector released

14.2.3 Other Module Hot-swap

Modules can be replaced during normal operation with minimal disruption of services, affecting only the relevant modules. The unit will automatically reconfigure the new module with identical values its predecessor. Therefore, the module will automatically begin decoding the same service decoded previously.

i	It is important to insert the new module into the same slot as the previous one; and ensure that their configuration is identical.

14.3 Adding, Replacing, or Removing Modules

Before upgrading a unit with additional modules, ensure that there is sufficient space (slots) in the chassis.

When all the new modules have been inserted into the chassis, make sure that the front of the chassis is completely closed with the front panels. Leaving a slot position open without a module or front panel will cause the unit to draw false air and consequently result in over-heating of the modules in the chassis.

To permanently remove modules from a specific slot position, the modules should first be removed from the chassis. Next, go to the **About** page from the **Navigation Pane**. Click to remove the modules. Modules flagged for removal will be ~~crossed out~~. Click again to deselect a module. Finally click **Apply Changes** to permanently remove the configuration of the module from the chassis.

When replacing an existing module, note that a module configuration always follows the slot position and not the module itself. Consequently, if a module is moved from one slot in the chassis to a new slot, the unit will report the original slot position as hardware missing, while the new slot position will be configured as a new module with default configuration. Hence if a module is to be replaced it is important that the same slot is used.

When replacing a module with a different module type, a mismatch will occur. This will be shown both in the alarms and in the **About** page. A DVB-S/S2 module however, can replace a QPSK module. When this happens, a convert button will show up in the **About** page along with the remove button. Clicking this button will enable the DVB-S/S2 module to inherit the configuration of the old QPSK module.

It is not possible to undo this process from the web GUI.

14.4 Importing and Exporting Chassis Configuration

The configuration of a unit can be saved onto a file to be retrieved later. This file contains the entire configuration, including the MMI IP address. To save the current configuration, click **Export** (see Figure 14.3).

To retrieve the configuration from an existing file, select the file by clicking **Browse**. Then, check **Include local IP addresses** if the IP addresses should be included, and click **Restore**.

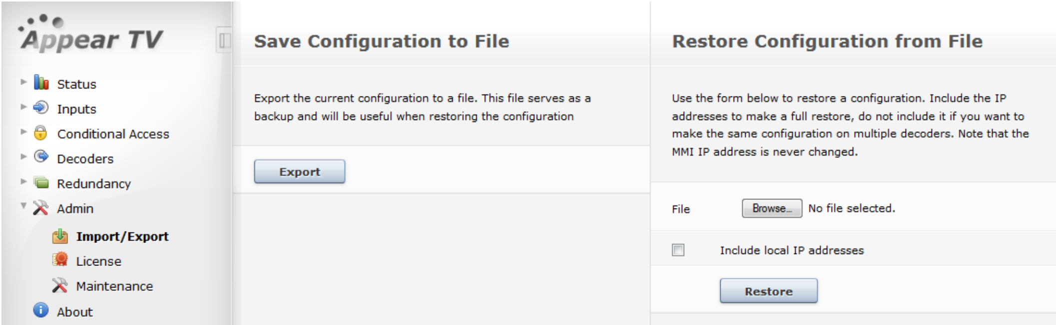


Figure 14.2- Saving Importing and Exporting Chassis Configuration

This feature has two benefit::

- To restore a unit to a previous state, or
- To use the same setup on multiple units

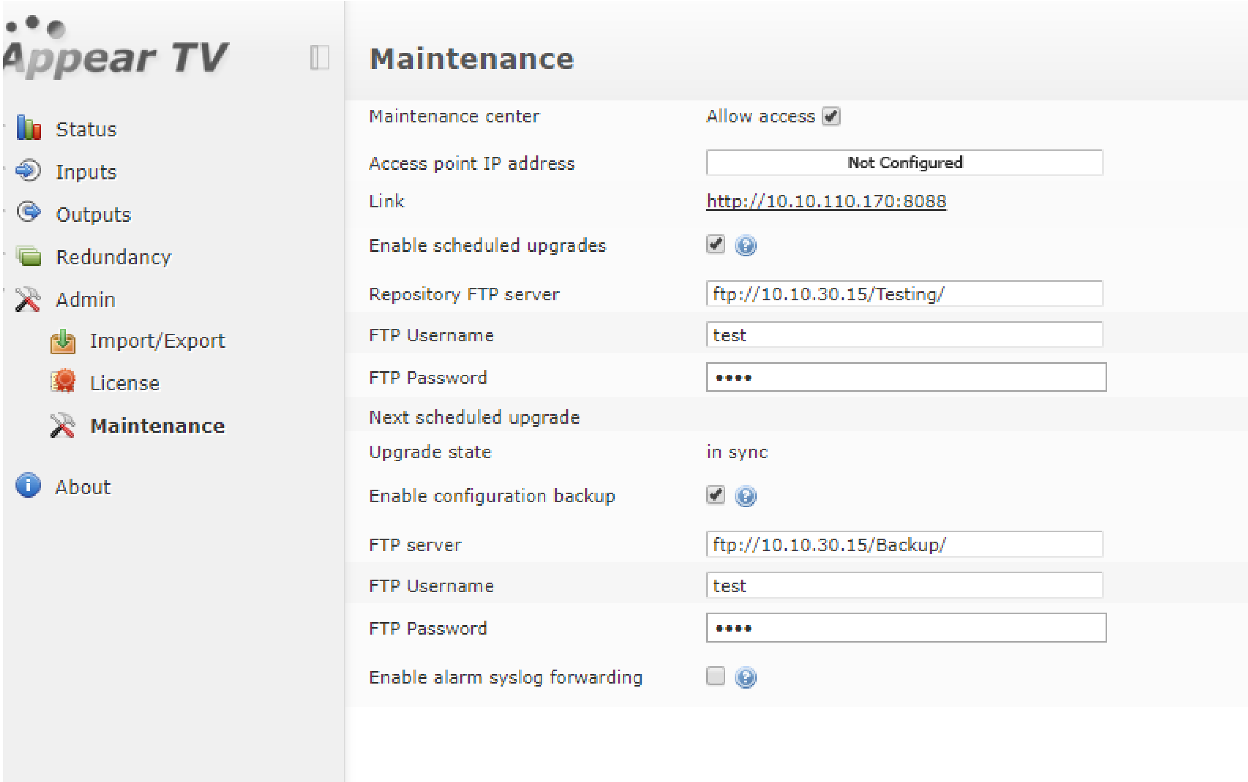
Use the **Include local IP addresses** option to bring a unit back to a previous state when lots of changes need to be undone; or if an upgrade has been unsuccessful.

It is recommended that the configuration be exported before each upgrade and restored after a downgrade (if the downgrade was unsuccessful).

To use the same setup on multiple units, uncheck the **Include local IP addresses** option. This way, only one unit needs to be configured, and all the other units will use the same configuration – but on their existing IP addresses.

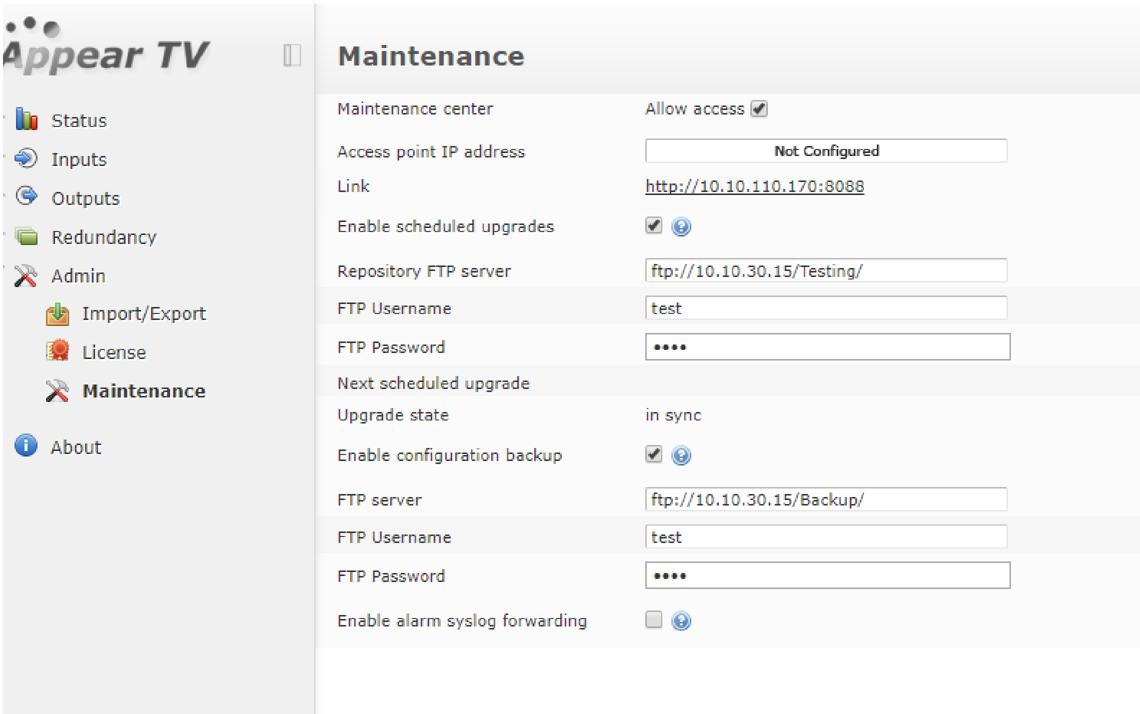
14.5 Maintenance Center Access

It is possible to allow/block access to the Maintenance center. A specific access point IP address can also be specified if required.



14.6 Support for Configuration backup

It is possible to automatically take a backup of the configuration database once per day to an external FTP account.



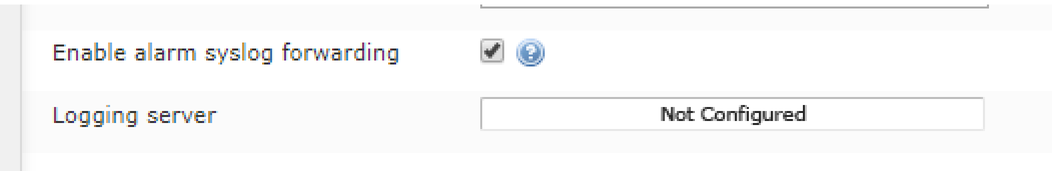
Enable Configuration Backup	Check box for Enabling configuration backup

FTP Server	Specify the FTP server address
FTP Username	Specify the FTP server username
FTP Password	Specify the FTP server password

- Each backup is stored in different file with timestamp.
- Only backup if there has been changes since last time.

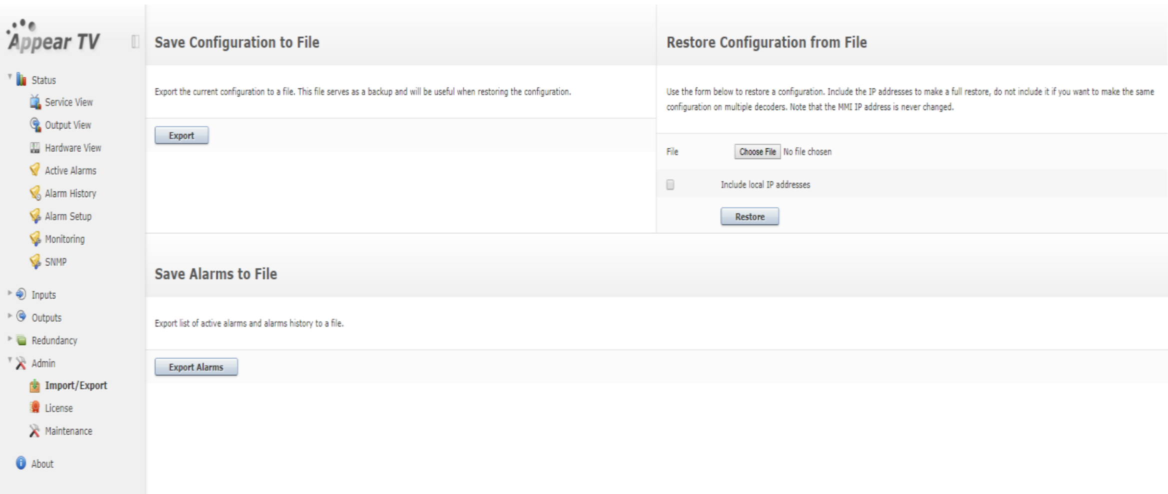
14.7 Syslog Export of Alarms

When an external syslog server is specified then all alarms raised should also be logged to the syslog which sends the entries to the external server.



14.8 Export of Alarm History

It is possible to export alarms from GUI. This will save the Alarm History as a CSV file.



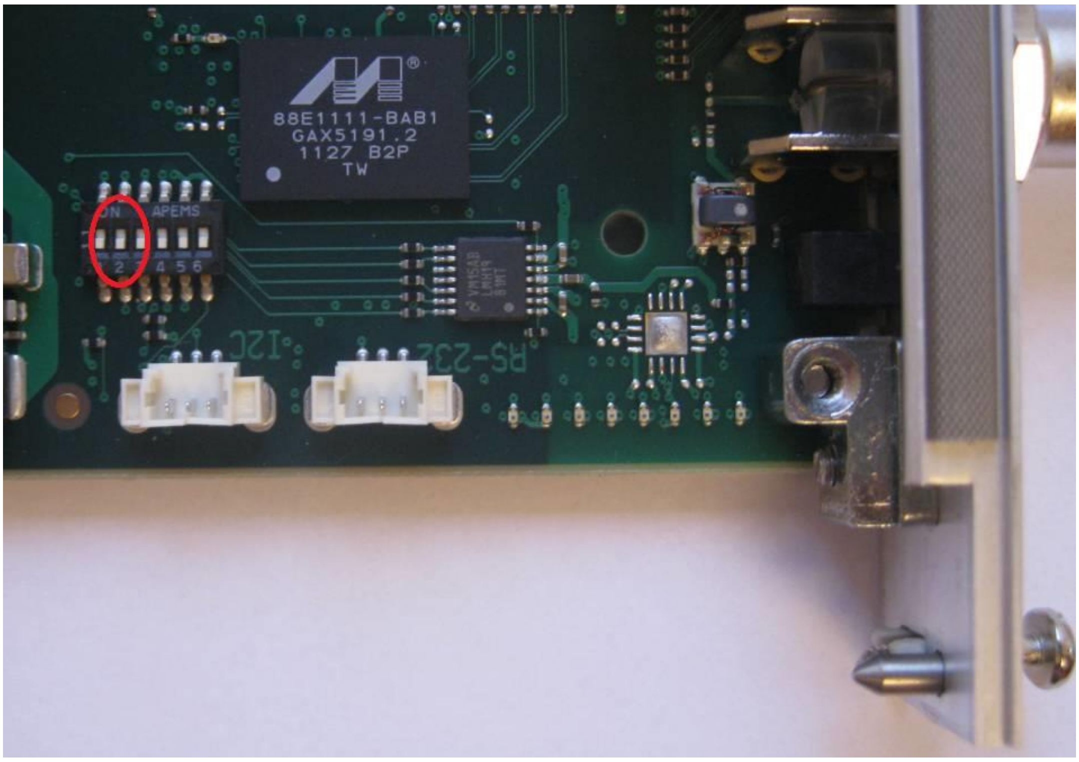
14.9 Restoring the Default IP Address

It is possible to restore to the factory-configured IP address on the Switch+MMI module. This can be useful if the software-configured IP address is lost. The restore is done by setting dip switch 2 to ON on the Switch+MMI card. When the setting has been applied, the MMI will be configured according to the tables below regardless of what is stored in memory.

The default IP settings are:

IP Address	192.168.1.100
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1

After setting the DIP switch the MMI card has to be rebooted. The factory default IP settings will be active as long as the setting is present. While the DIP switch on, all IP parameters in memory can be changed and saved via the web interface. Once the DIP switch is changed back to OFF and the card is rebooted, the IP settings in memory will be activated.



14.10 Restoring the Default IP Address for 1RU (XC5100).

14.10.1 Resetting IP address using USB Cable

The Switch+MMI module control can be accessed via Ethernet over USB. A USB A/A cable (standard-A type connector in both ends) should be connected between a PC and the MMI module.

To access the MMI a driver for **RNDIS Ethernet gadget** must be installed.

On a Windows PC the driver can be installed automatically over Windows Update, or it can be downloaded manually. The Switch+MMI module can then be accessed directly from a web browser, using the IP address **169.254.254.254**.

All MMI functionality is supported over this interface.

14.10.2 Resetting IP address with DIP switch

It is possible to restore to the factory-configured IP address on the Switch+MMI module. This can be useful if the software-configured IP address is lost. The restore is done by setting DIP switch **2** to 'ON' on the Switch+MMI card. When the setting has been applied, the MMI will be configured according to the tables below regardless of what is stored in memory.

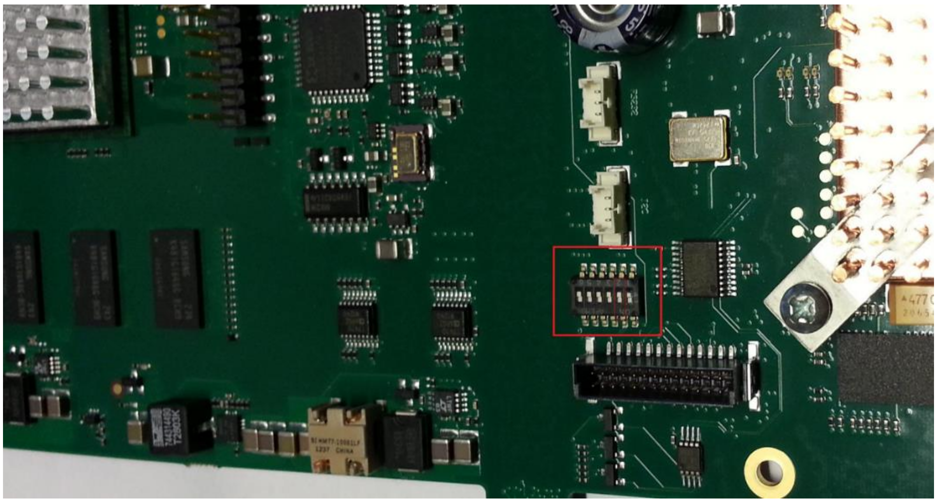
The default IP settings are:

IP Address	192.168.1.100
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1

After setting the DIP switch the MMI card has to be rebooted. The factory default IP settings will be active as long as the setting is present. While the DIP switch on, all IP parameters in memory can be changed and saved via the web interface. Once the DIP switch is changed back to OFF and the card is rebooted, the IP settings in memory will be activated.

In order to remove the module, the following procedure must be followed:

1. Loosen the thumb screws for the fan assembly and remove the fans
2. Loosen the thumb screws on the MMI module
3. Press on the Switch-MMI module to come out little.
4. Take out complete Switch-MMI module.
5. Set DIP Switch 2 = ON
6. Replace both MMI and fan assembly



14.11 Restoring the Default CLI Password

It is possible to restore to default SSH/CLI password for the MMI Module. The restore is done by setting dip switch 5 to ON on the Switch+MMI card.

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