How to establish an ST2110-30 and -31 compliant AoIP stream

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Introduction

This document is referring to and based on the document *How to establish an AES67 compliant AoIP-Stream with DirectOut's MONTONE.42 and RAV.IO* and only intends to describe the differences to the workflow described in the above mentioned document. It refers also to *AES67 / SMPTE ST 2110 COMMONALITIES AND CONSTRAINTS*, a document published by AIMS, and intends to explain how to implement the definitions when using DirectOut's MONTONE.42 and RAV.IO

Support of the PTP profile defined in SMPTE ST 2059-2

There are a few differences between the AES67 Media profile and the SMPTE ST 2059-2 profile. The latter e.g. requires a faster Announce interval (4 per second) and a bigger range of sync message rates e.g. to speed up the sync recovery of a system after a power-down. More detailed information and proposed default values are set out in the AES Report "AES-R-16-2016: PTP parameters for AES67 and SMPTE ST 2059-2 interoperability".

Required option to force a device to operate in PTP slave-only mode

According to AES67 MONTONE.42 and RAV.IO may act as PTP Grandmaster. This functionality can be turned off and the units can be forced to "slave-only" mode, a feature which is mandatory when being a member of a ST2110 network.

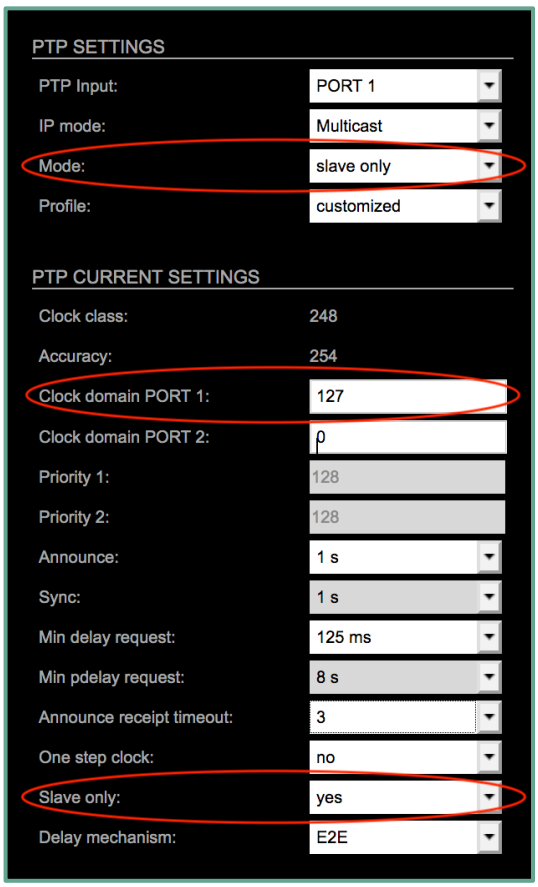

Figure 1: PTP Settings ST-2059

An offset value of zero between the media clock and the RTP stream clock

MONTONE.42 and RAV.IO do transmit all streams with an offset of 0 between media clock and RTP stream clock by default. At the receiving end you can select *Manual configuration* in the *Discovery protocol* drop-down list on the Input stream settings window to configure the *Media offset* to "0".
If you connect the stream using RTSP, SAP or NMOS and the media offset information is included in the SDP, the media offset parameter will be configured accordingly. Manual configuration is not required in this case.

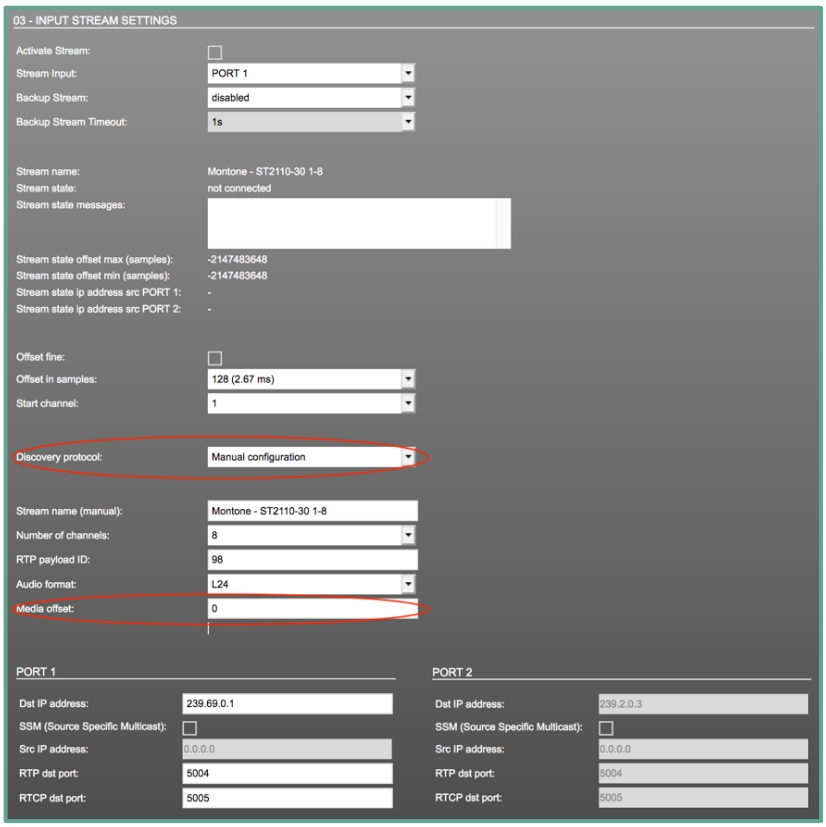

Figure 2: Manual stream discovery

Multicast

ST 2110 does not define the multicast IP range as that is done for AES67, it is allowed to use any multicast IP address outside the administratively scoped range 239.xxx.xxx.xxx. DirectOut's MONTONE.42 and RAV.IO do support the use of literally any multicast address.

IGMP

ST2110 requires the support of IGMPv3 (whilst AES67 requires IGMPv2), which includes the down-compatibility to v2. Whenever a network or partial network is downgraded to IGMPv2, the support of source specific multicast (SSM) will be affected.

Conformance Levels

In addition to the minimum requirements to be compliant to ST 2110-30 there are stream configuration parameters called Conformance Levels.
The following describes how to setup streams and corresponding receivers obeying those conformance levels:

Level A:

48kHz, 1-8 channels, 1ms packet time

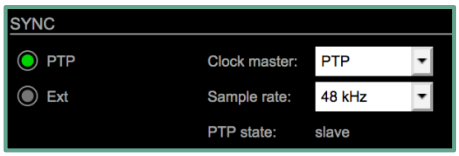

Figure 3: Clock settings Level A,B,C

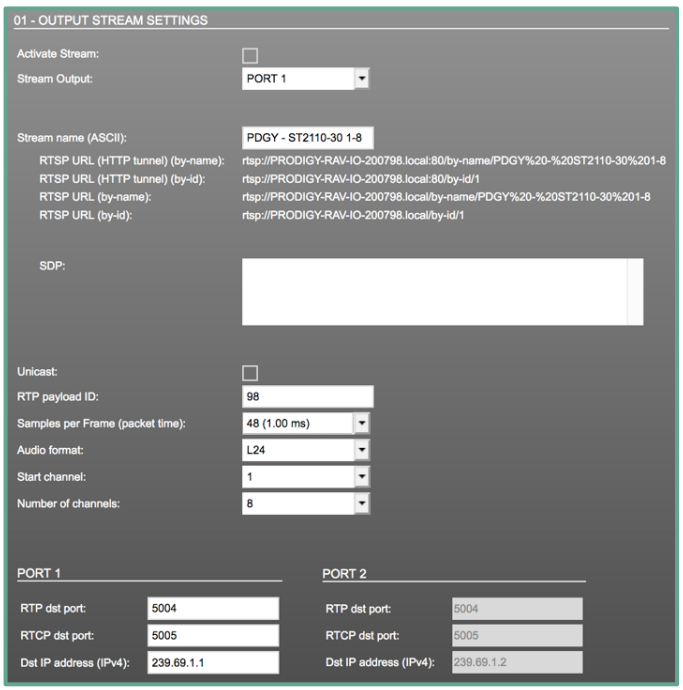

Figure 4: ST2110-30 Level A stream TX settings

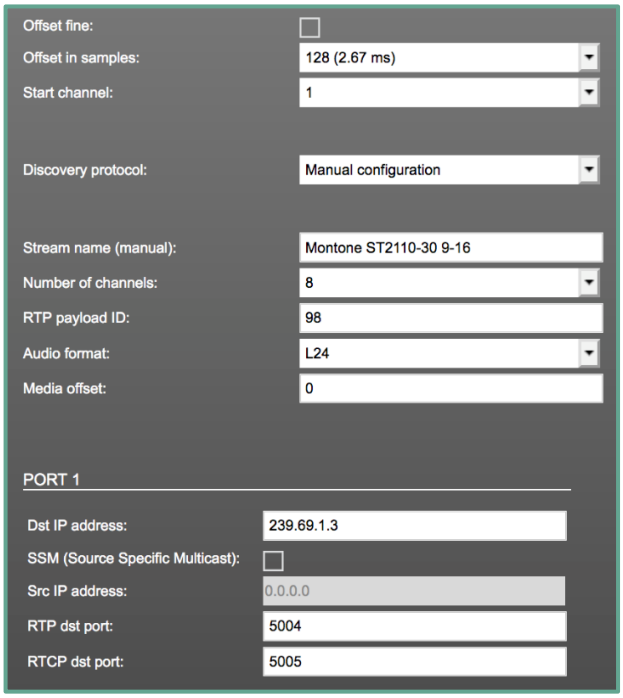

Figure 5: ST2110-30 Level A stream RX settings

Level B:

48kHz, 1-8 channels, 125µs packet time

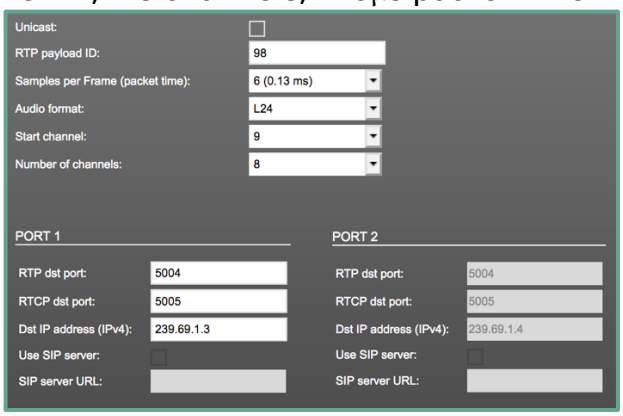

Figure 6: ST2110-30 Level B TX stream settings

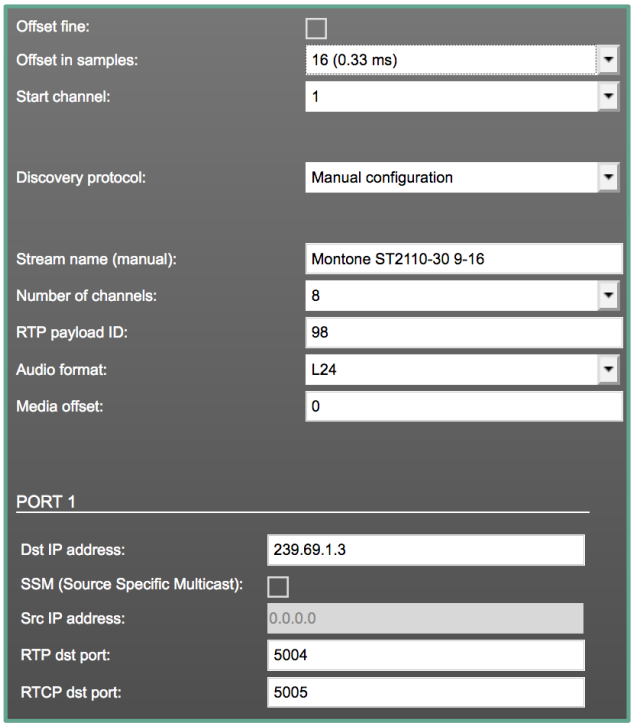

Figure 7: ST2110-30 Level B RX stream settings

Level C

48kHz, 64 channels, 125µs packet time

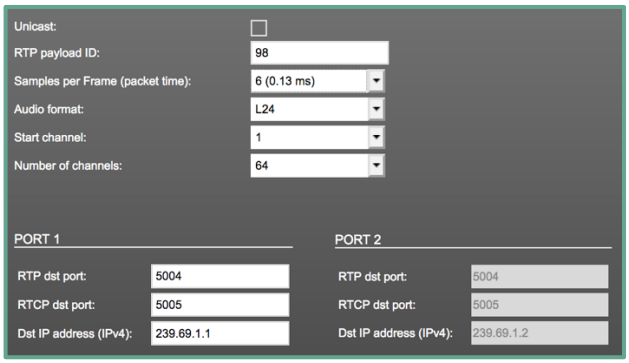

Figure 8: ST2110-30 Level C stream TX settings

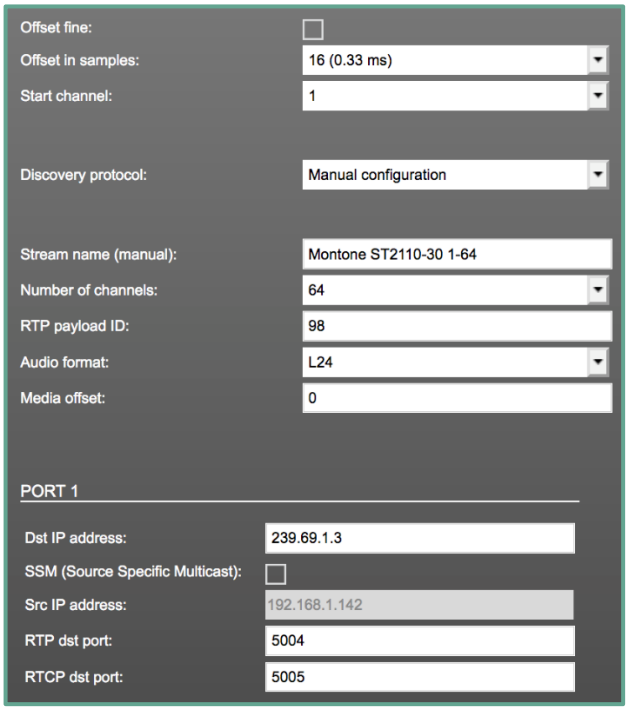

Figure 9: ST2110-30 Level C stream RX settings

Level AX:

96kHz, 1-4 channels, 1ms packet time

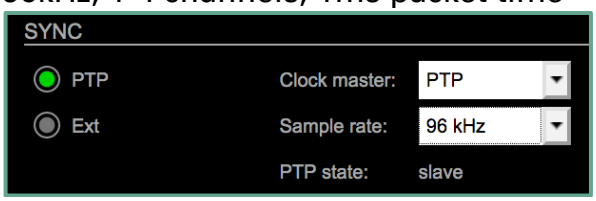

Figure 10: Clock settings Level AX,BX,CX

Figure 11: ST2110-30 Level AX stream TX settings

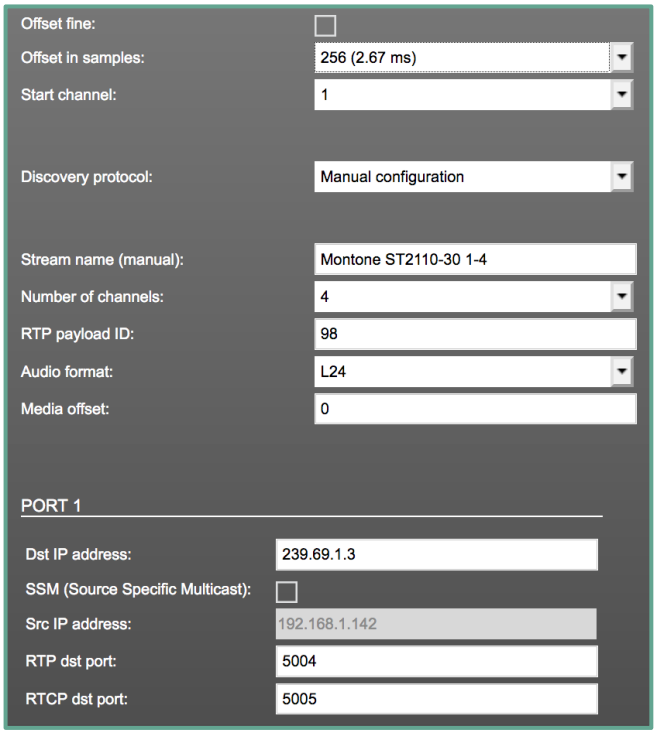

Figure 12: ST2110-30 Level AX stream RX settings

Level BX:

96kHz, 1-4 channels, 125µs packet time

Figure 13: ST2110-30 Level BX stream TX settings

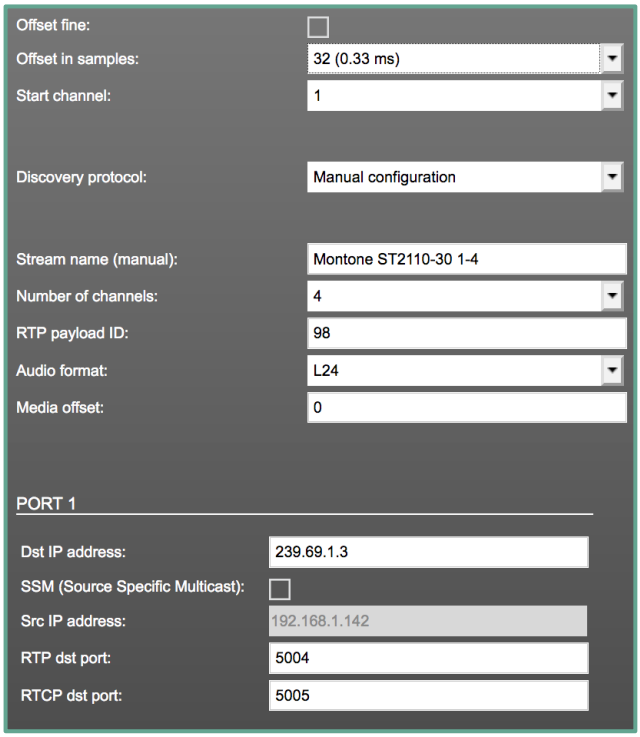

Figure 14: ST2110-30 Level BX Stream RX settings

Level CX:

96kHz, 32 channels, 125µs packet time

Figure 15: ST2110-30 Level CX stream TX settings#

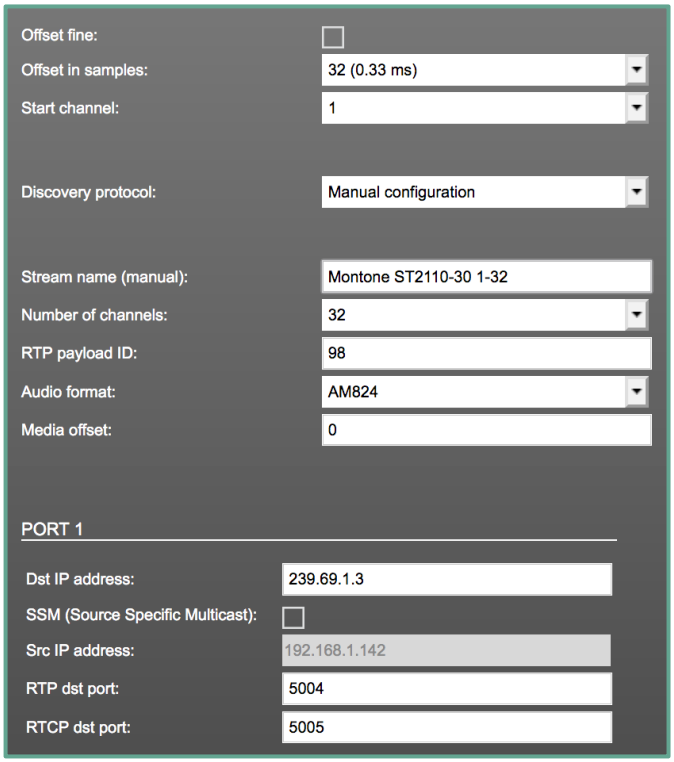

Figure 16: St2110-30 Level CX stream RX settings

ST2110-31

The subset -31 of the standard ST2110 defines the bit transparent transport of 32bit AES3 signals over IP networks.
On the IP side all above mentioned parameters apply here as well, but the audio format changes from L16 or L24 for PCM audio to AM824. To accommodate all 32 bits the Conformance Levels are defined slightly different in -31 (Level A -> 6ch, Level B -> 8ch, Level C -> 60ch). AM824 is not part of AES67, but crucial for broadcast environments e.g. for intercom transport.

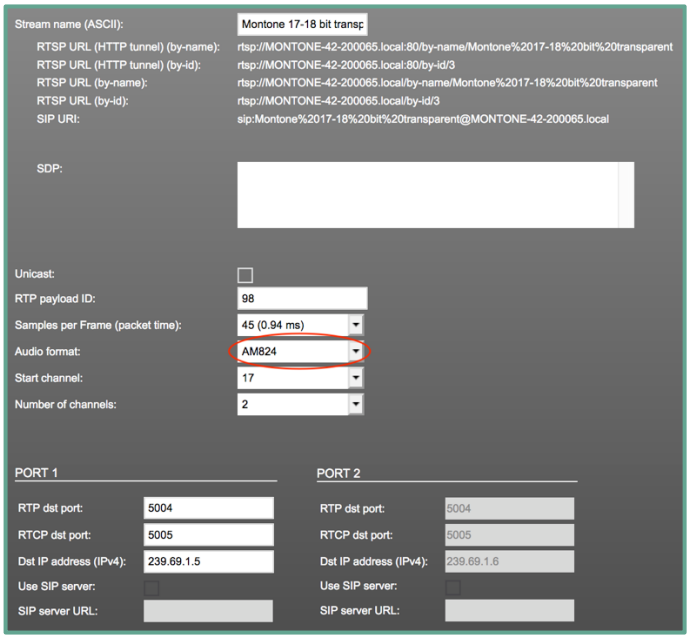

Figure 17: ST2110-31 stream TX settings

In MONTONE.42 you will have to define the transparency mode for the baseband MADI interfaces. You find the settings under MADI out settings. Select "on/off" in the drop down list *Subcode Transparency* and select "VUCP only" or "full" from the *Transparency Mode* drop down list. We do recommend to use VUCP only mode, it will transparently transport Validity bit, User bit, Channels status bit and Parity bit which is sufficient for most cases.

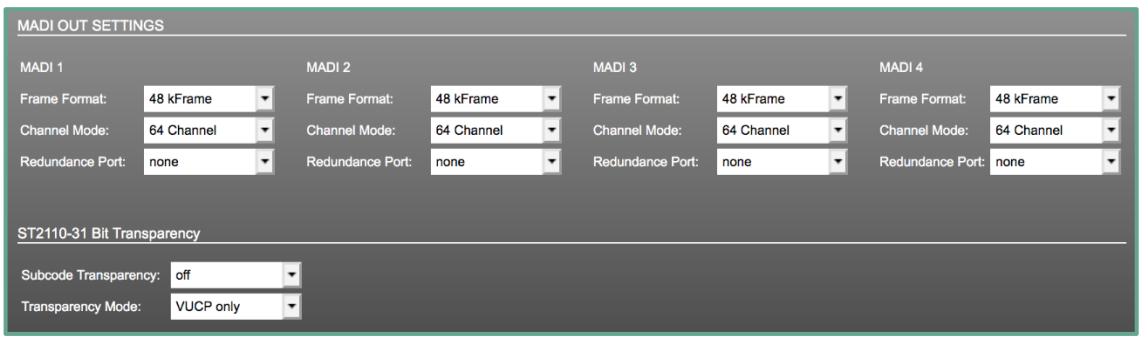

Figure 18: MONTONE.42 ST2110-31 Bit Transparency Settings

The same procedure applies for the Prodigy.MC or Prodigy.MP unit where RAV.IO is installed. You can find the settings in the globcon tab *Output Format* or *AES Output Format.*

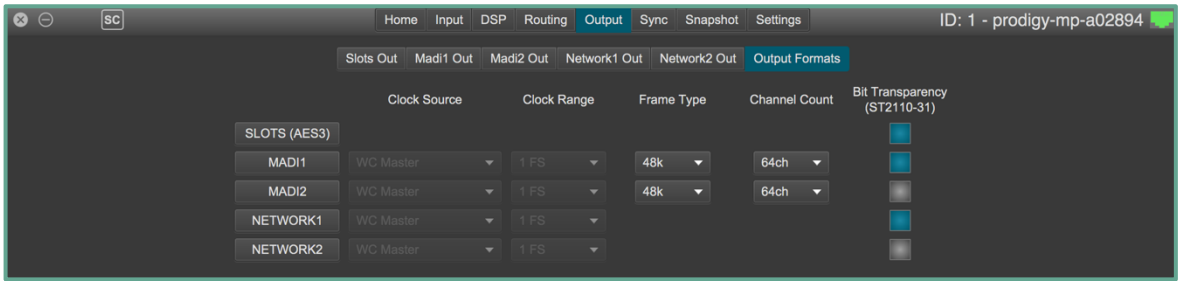

Figure 19: Prodigy ST2110-31 Bit Transparency Settings

Quality of Service (QoS)

Switches used in an AES67 capable infrastructure should support DiffServ to provide correct prioritising of PTP and RTP packets. A node supporting AES67 shall tag PTP and RTP packets with different values which support priority settings for the data transport. AES67 default DSCP tags:

PTP (clock packets)	DSCP value: EF/46/0x2E
RTP (audio packets)	DSCP value: AF41/34/0x22

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