DADlink Format and Audio Data Formats Supported via Mini MADI Module

Currently, on the DAD AX32, Penta 720 and 721s, and DAD Thunder|Core products, as well as on the NTP-developed Avid MTRX and MTRX II, there is an option to install our Mini MADI module. The module has two ports where optical or coaxial SFP modules can be installed.

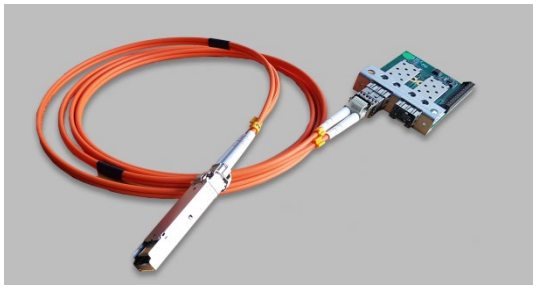

Fig. 1, Mini MADI module installed with bidirectional optical fiber and SFP

Base units with the Mini MADI module installed can accommodate three different audio data formats, which can be set-up via the DADman software: MADI and the two NTP proprietary 'Fast Link' formats DADlink and Hotlink.

For the DAD Thunder|Core and Avid MTRX II products, MADI and DADlink formats can be selected independently for each port. For DAD AX32, Penta and AVID MTRX products, MADI, DADLink and Hotlink format can be selected.

Fig. 2, Format section in DADman

When the MADI format is selected, each port has 64 bidirectional channels @48kHz according to the MADI AES10 standard. The SFP modules can be optical types for optical fiber interconnection or mini BNC types for electrical connection via coax cables. The MADI format according to AES10 is 24bit fix point and scales downward channel-wise with higher sample-rates. The interface does not accommodate any sample time stamp information. The latency is 2 samples plus the system of 7 samples. @48kHz the latency is 187 micro seconds.

When the DADlink format is selected, each port has 128 bidirectional channels @48kHz according to the NTP proprietary standard for DADlink and scales downward channel-wise with higher sample-rates. Sample rates up to 384kHz is supported, and the SFP modules should be optical 1000Base types (1Gbit) for optical fiber interconnection.

The DADlink format provides zero latency (< 100 nano seconds) digital interconnection between units with a 28bit floating point resolution, which is matching the internal processing resolution of the base units 1:1. Further, all audio channels are transparent for the timestamp system generally implement on all the I/O interfaces in all base units, assuring that all signals are phase-accurate and presented with the 7 samples system delay across one or more units.

When the Hotlink format is selected, each port has 128 bidirectional channels @48kHz according to the NTP proprietary standard for Hotlink. Only the 48 kHz sample rate is supported. The format provides backwards compatibility for the 625 and 725 NTP broadcast router products. The hotlink format provides low latency (< 10 microseconds) digital interconnection between units with a 24 bit fixed point resolution. Further, all audio channels are transparent for the timestamp system generally implement on all the I/O interfaces in all base units assuring that all signals are phase-accurate and presented with the 7 samples system delay across one or more units.

The format on each bidirectional link can be selected independently. Below is an overview of the specifications for the three different formats:

MADI format	
Channels and Sample rates	64ch @44.1/48 kHz, 32ch @88.2/96 kHz, 16ch @176.4/192 kHz
Resolution	24 bit integer (approx..141 dB dynamic range)
Latency	2 samples + 7 samples system delay (187 micro seconds @48 kHz) per connection
Time stamp	No transparency for audio time stamps
Phase alignment	No alignment across more interconnected base units
SFP modules	• Optical 850nm or 1300nm (or other wave lengths) 100Base or 1000Base types. Single mode or multimode depending on optical fibers used. • Mini BNC types for electrical connection via 75 Ohm coax cables

DADlink format	
Channels and Sample rates	128ch @44.1/48 kHz, 64ch @88.2/96 kHz, 32ch @176.4/192 kHz, 16ch @352.8/384 kHz, DSD
Resolution	28 bit floating point (237 dB dynamic range, 96 dB additional head room)
Latency	Less than 100 nano seconds (0.005 sample @48 kHz) per connection

	(compensated by the system delay)
Time stamp	Transparency for audio time stamps across multiple base units
Phase alignment	Alignment across more interconnected base units within the system delay normally set to 7 samples. This can be increased for larger systems.
SFP modules	• Optical 850nm or 1300nm (or other wave lengths) **1000Base** types. Single mode or multimode depending on optical fibers used

Hotlink format	
Channels and Sample rates	64ch @44.1/48 kHz, 32ch @88.2/96 kHz, 16ch @176.4/192 kHz
Resolution	24 bit integer (approx. 141 dB dynamic range)
Latency	2 samples + 7 samples system delay (187 micro seconds @48 kHz) per connection
Time stamp	Transparency for audio time stamps across multiple base units
Phase alignment	Alignment across more interconnected base units within the system delay normally set to 7 samples. This can be increased for larger systems.
SFP modules	• Optical 850nm or 1300nm (or other wave lengths) 100Base or 1000Base types. Single mode or multimode depending on optical fibers used

DADlink Functionality Explained

The DADlink format can be seen as a digital audio signal extension directly connected into the 'belly' of the digital processing system of a base unit. This connection provides up to 128 bidirectional channels between units where no significant interface latency is introduced. And with full transparency for the time stamp data which is added on the input signals of all analog or digital input interfaces in any base unit.

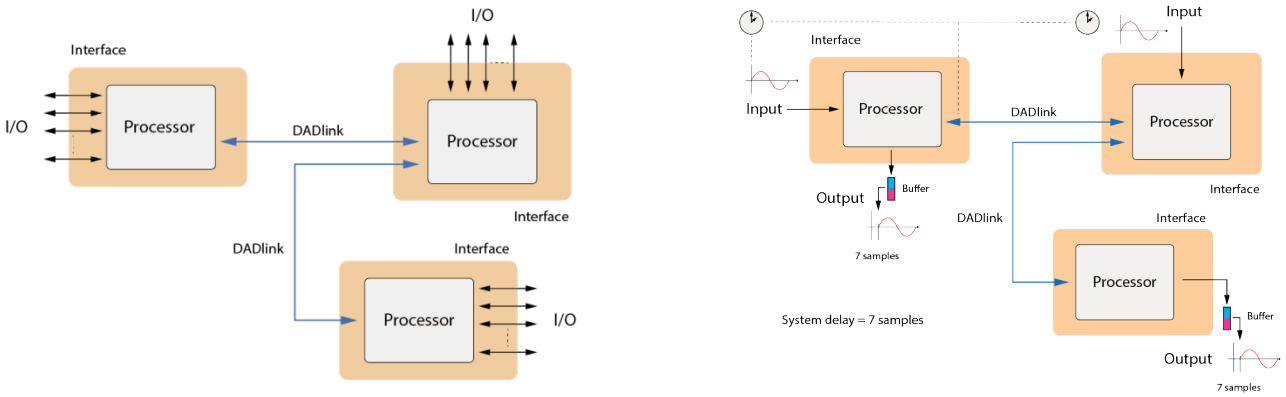

Fig. 3, DADlink interconnection and time alignment

Internally in all base units, there is a system providing a 100% phase-accurate presentation of audio signals on the outputs regardless of the routing and processing path actually established in a unit via routing or monitor control, summing and SPQ. This system relies on all input signals being provided with a time stamp when sampled, and each output interface having a buffer system, which aligns the signal to the same latency equal to the system delay set via DADman - normally 7 samples (145 microseconds @48kHz, 72,5 microseconds @96kHz etc.). With the DADlink used as interconnection between one or more units, this mechanism is preserved including full-signal resolution and support for all sample rates.

In systems with more units interconnected, one unit should be the clock master and the other units need to synchronize to the DADlink input in order to assure that all units have the same clock and time stamp reference. This is automatically distributed between all units via the DADlink connection.

Below is a figure showing an example of units in a system connected via DADlink.

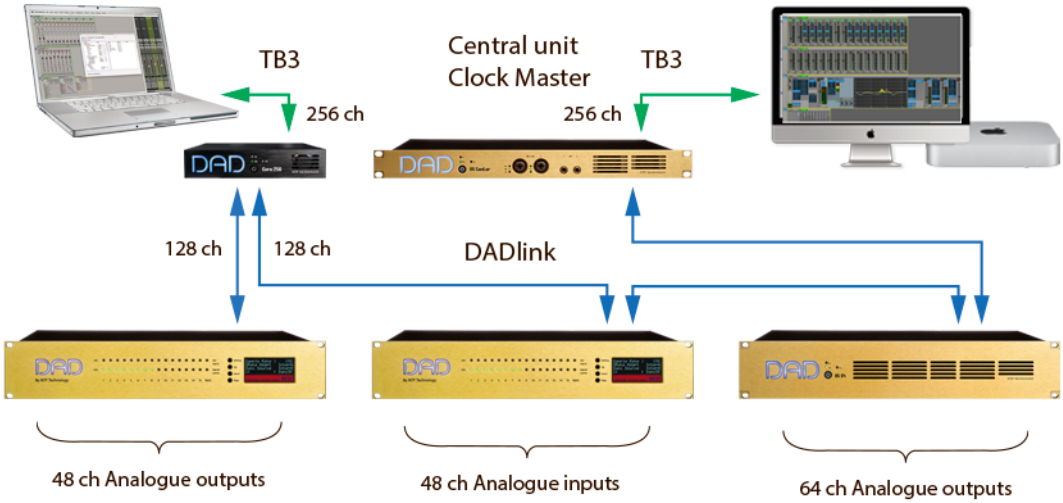

Fig. 4, DADlink system inter connection