

TECHNICAL NOTE

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4REA4 RANGE & A3232 DMI interface

NETWORK AND AUDIO INTERCONNECTION CABLE REQUIREMENTS

The 4REA4 family of audio control and interfacing components is interconnected using the 3 sets Ethernet standard connections as noted below, although all 3 are often not required to all units within a system.

Refer to individual 4REA4 product guides and manuals for the setup and use of the component units.

These notes apply to the mixer and Orange Box A3232 DMI interface module where relevant to A3232, in particular with respect to the choice of connecting cables.

A-Star link connections

A-Star is the "bulk" audio and control connection from 4REA4 main processor to remote A-Star distributors (network switches). Typically, these will then feed several A3232 connections locally.

The data is Gigabit Ethernet point-to-point connection (1000BASE-T, IEEE 802.3ab), Layer 2 compliant.

No network switches should be used. To extend the range, use compatible media converters (see the notes below).

A3232 link connections

A3232 is audio and control connection to individual IO devices (stage and wall boxes etc.) These will connect the device to either an A-Star distributor, directly to the 4REA4 controller or other A3232 interfaces such as Digico DMI option modules.

The data is Fast Ethernet point-to-point connections (100BASE-TX, IEEE 802.3u), Layer 2 compliant. No network switches should be used. To extend the range, use compatible media converters (see the notes below).

DiGiCo 4REA4 Control Protocol Network

This connects the (user supplied) main control PC running 4REA4 Controller software (and iPad running APAD app if used) to the 4REA4 main processor/engine.

The data is Gigabit Ethernet (1000BASE-T, IEEE 802.3ab). (Proprietary application network layer protocol).

4REA4 Control Protocol network also connects the various 4REA4 controller devices (AControllers & A88 GPIO) to the 4REA4 engine.

For these peripheral devices the data is Fast Ethernet (100BASE-T) IEEE 802.3.

All 4REA4 controllers (and A88 GPIO) can be powered by PoE (power over Ethernet) or POE+ (in the case of the AControl 8). Alternatively, the AControl 6, AControl 8 & A88GPIO can be powered with their own local external PSU. This PoE must be provided locally by the system integrator with a compatible network switch. Refer to the various 4REA4 product guides and manuals for power consumption information.

Factory Portable Cables

These are available using rugged touring grade Cat 6 cable and Neutrik EtherCON connectors suitable for all 4REA4 applications

p/n LEADS0070 75M on plastic spool
p/n LEADS0071 10M

Choice of custom and installation cables

Standard good quality Ethernet connection systems can be used, that comply with the standards notes above (Fast Ethernet or Gigabit Ethernet).

It should be noted 4REA4 devices all use Neutrik EtherCON Cat5e connectors which are not compatible with Neutrik Cat6 equivalents. Built in units do not necessarily need to use these.

Note Digico D-Rack Madi Over Cat 5 cables with ferrite suppressors fitted are not suitable for use with 4REA4 (or other Ethernet applications).

As of time of writing Cat5e cabling is no longer widely manufactured and Cat 6 cable is now the industry standard for Ethernet installations and portable use.

New cabling should be STP (screened/shielded twisted pair) Cat 6 compliant. The use of copper (not so-called CCA) cables is strongly recommended, especially for PoE applications.

Otherwise installed wiring compliant with the relevant Ethernet connection standard will be expected to work.

Note the standard cable limit on any wired Ethernet system is 100m between equipment nodes.

General rules for system installations

Further applications notes may be found in the 4REA4 user and installation guide.

In typical installations 4REA4 should operate on separately connected networks independent of regular computer networks. (This may be possible using a VLAN, see notes below)

Smart / managed switches may allow turning off Layer 3 or 4 functions, however this will still not work in most instances.

Layer 2.5 and higher protocols including Spanning Tree, Tagged Egress Packets, and Broadcast Storm Protection can cause interruption to audio data or audible clicks.

Typical applications may also include conversion to fibre optic for longer cable runs between 4REA4 central unit, A-Star switches, A3232 IO devices and controllers or integration within an existing network infrastructure in a building. Refer to notes below.

When using a media converter, we strongly suggest checking for errors and test for functionality and reliability before putting the system into service

Fibre optic cable connection

Larger or longer distance system will usually include portion of fibre optic (FO) connections.

Note 4REA4 Ethernet data systems are not related in any way to Optical madi (e.g. Digico Purple Box) or Optocore® devices that can also be used with the system. The different data/audio systems cannot be mixed in 1 optical connection system.

The recommended Cat5 to FO converters will work, provided they are set to the required connection type / speed (see above), however please note the following.

The ports should be forced to 100Mbps (Fast Ethernet) for A3232 or Gigabit Ethernet for A-Star. Auto-negotiating ports often do not work correctly with these systems. If the converter is fixed speed or can be hard set to the correct speed, it should work correctly.

The following Optical short-range installation type compact free-standing converters have been tested:

TP-Link MC100CM 10/100Mbps Multi-Mode Media Converter
SC connection to Multimode extending up to 2Km
Works with: A3232

TP-Link MC200CM Gigabit Multi-Mode Media Converter
SC connection to Multimode extending up to 500m
Works with: A-Star

Use the exact models as stated above, do not use other models with removable transceivers.

Notes on VLANs

We understand the desire to set up a VLAN to allow mixing A-Star and A3232 with other traffic. However, tests have shown most switches were not capable of running a VLAN or trunked VLAN with the time accuracy required by A3232 & A-Star.

The use of VLAN in order to handle mixed network traffic requires considerable IT networking expertise during installation and testing of any particular system. Please read the following notes before considering this.

It might take some trial and error to configure a VLAN for use with A-Star or A3232, and the actual configuration depends on the specific switch in use within a specific system. Therefore, Digico and its distributors do not recommend using network switches within a system.

One VLAN is needed for each point-to-point connection i.e. you cannot have more than two devices on the same VLAN. No other traffic should be present on this VLAN.

The ports should be forced to 100Mbps (Fast Ethernet) for A3232 or Gigabit Ethernet for A-Star. Auto-negotiating ports often do not work correctly with these systems.

The ports need full 100Mbps / 1000Mbps bandwidth. This means that, in order to have a A-Star VLAN on a switch, the trunk between switches must be 10 Gigabit minimum.

ALL Layer 2.5 and higher protocols must be disabled, as mentioned above. Essentially any packet on the VLAN other than audio transport is likely to cause audible glitches. The VLAN should be fully transparent to Layer 2 traffic, with no extra packets.

The IT manager should take care that 4REA4 UDP discovery broadcast protocol, that allows the 4REA4 main-unit auto-discover the controllers, is functioning via port 51320.

Note that if auto-device discovery is not possible due to IT management requirements, the IP address of each controller also can be entered manually in the system during first startup of the system.

We strongly advise to use fixed IP addresses for control network in a chosen range within a VLAN in large installations. If IT management requires the use of DHCP, then arrange within the IT management a fixed range and permanent IP reservations for each controller.