Fibre optic network for professional audio, data and video

New MADI Series
Over the past two decades OPTOCORE has been the most prominent provider of time critical, redundant, audio, video and control infrastructure.

OPTOCORE networks are used in a wide variety of environments, including opening and closing ceremonies of the world’s most prominent events, as well as an alternative to copper infrastructures in OB vans, stadiums, studios and theatres. OPTOCORE systems scale down to point to point portable stageboxes with mixing console integration.

OPTOCORE is based on the open AES3 and AES10 (MADI) standards providing transport, routing, format conversion as well as distribution of audio, video and control data with full management and diagnostic capabilities.

Development and manufacturing

All technologies and products are developed and maintained by an in house R&D team. The R&D department strives for efficient and elegant design of hardware, software and firmware. Be that in use of the planets resources, energy efficiency or coding.

All assembly, testing and burn-in of our products is performed at our manufacturing base in Munich, Germany.

Education and training

OPTOCORE has a deep commitment to training and education. OPTOCORE offers a series of training seminars to educate the industry about OPTOCORE network design and operation, digital audio and an introduction to use of fibre optics cables as an interconnect. OPTOCORE Certification Training (OCT) seminars are hosted regularly around the world.

OPTOCORE Certification Training (OCT) is eligible for InfoComm CTS renewal units.

Timeline:

- 1993 OPTOCORE Technology Patent
- 1996 Release of the first OPTOCORE products
- 2000 OPTOCORE becomes a network with digital connectivity
- 2002 OPTOCORE implemented by DiGiCo
- 2003 OPTOCORE GmbH incorporated
- 2008 The OPTOCORE network triples in size
- 2009 Introduction of the R-series hardware platform
- 2012 The capacity of OPTOCORE is doubled to 2Gb

OPTOCORE introduced at the German Science Fair in 1993

The first OPTOCORE devices by Brunke Electronics in 1996

OPTOCORE Product Brochure 2002

OPTOCORE is, and will be, an independent company that embraces open standards.
**FEATURES**

The high bandwidth infrastructure

OPTOCORE is a high bandwidth network designed specifically to meet the requirements of professional audio and video. OPTOCORE offers a unique solution that is flexible and scalable, yet intuitive and easy to use. OPTOCORE is a modern replacement for traditional copper cable plants and manual patching.

Open platform – the Autobahn for your audio, video and control

OPTOCORE is an open platform. Designed to transparently transport and route industry standard signal formats such as MADI, AES/EBU as well as Ethernet, DMX, MIDI, RS-485/422 and CAN BUS.

OPTOCORE converges and simplifies any cabining and patching infrastructure.

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**OPTOCORE Features**

- De-centralized audio, video and data routing
- High capacity
- Control transport
- Low latency
- Redundancy
- Integration options
- Optical isolation
- Low cost of ownership
- Future proof hardware and software
- Scalability
- Lossless long distance transmission

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**The OPTOCORE fiber network is capable of:**

- Up to 1024 audio input channels
- UNLIMITED number of outputs
- 32 routable Serial Channels
- Composite Video transport
- Fast Ethernet transport and Switching
- Up to 24 device networks, expandable to 216 devices using SANE

**SANE is capable of:**

- Up to 64 audio input and output channels
- Fast Ethernet transport and Switching

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**Topology Options**

- Point to Point Links
- Daisy Chains
- Star Topology
- Ring Topology

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**OPTOCORE Technical Partners**
The X6R and V3R platform allows customizable analog, digital and network connectivity utilizing state of the art circuitry for the highest sonic performance and ultimate reliability.

The devices are populated at the time of manufacturing with analog, digital and network options.

**Network and Digital Connectivity Options:**

**FX – The OPTOCORE fibre network module**
- allows the converter to be used as a part of a 24 device OPTOCORE redundant ring topology network.
- 4 Serial ports – Sync – 2 LAN ports – 2 SANE/LAN ports

**TP – The SANE Cat5 module**
- allows the converter to be used as a stand alone converter or expansion device for OPTOCORE FX devices.
- 16 AES3 I/O – Word Clock I/O – 1 LAN port – 2 SANE/LAN ports

**Converters**
- include AES3 ports for conversation to and from the analog inputs and/or outputs.
- 16 AES3 I/O – Word Clock I/O – 1 LAN port

The X6R 16 channel converter can be populated with two 8 channel input or output modules for up to 16 inputs, 16 outputs or a mix of 8 inputs and outputs.

The V3R 8 channel converter can be populated with a single 8 channel input or output module.

**Analog Devices:**

- **X6R-16MI** – 16 Mic Inputs
- **X6R-DualMI** – 8 Dual-Mic Inputs
- **X6R-16LI** – 16 Line Inputs
- **X6R-16LO** – 16 Line Outputs
- **X6R-8MI/8LO** – 8 Mic Inputs, 8 Line Outputs
- **X6R-8MI/8LI** – 8 Mic Inputs, 8 Line Inputs
- **X6R-8LI/8LO** – 8 Line Inputs, 8 Line Outputs

- **V3R-8MI** – 8 Mic Inputs
- **V3R-8LI** – 8 Line Inputs
- **V3R-8LO** – 8 Line Outputs

The above connectivity combinations are available with FX, TP network modules and as stand alone Converters.

- **X6R-FX-8AE/8MI** – 8 AES I/O, 8 Mic Inputs
- **X6R-FX-8AE/8LI** – 8 AES I/O, 8 Line Inputs
- **X6R-FX-8AE/8LO** – 8 AES I/O, 8 Line Outputs

**Connectivity Options:**

- **MI** – Microphone Inputs – 8 channel microphone preamp. High quality 1dB analog gain step preamplifiers.
- **DualMI** – Dual Microphone Inputs – 8 channel dual microphone preamp, for a total of 16 network inputs. Each input is fed to two microphone preamps that can be independently routed and controlled on the network.
- **LI** – Line Level Inputs – 8 channel Line Level Input module.
- **LO** – Line Level Outputs – 8 channel Line Level Output module.
- **AE – AES3 I/O** – 16 channel AES3 switchable I/O module. Available for FX devices and can be ordered in conjunction with analog input and output modules.

Redundant Power Supply, DC input and XLR panels are available as options.
**INTERCOM CONNECTIVITY**

The X6R-INTERCOM and V3R-INTERCOM platform allows customizable intercom, control and network connectivity, utilizing state of the art analog and digital circuitry for ultimate reliability.

The devices are populated at the time of manufacturing with intercom, control and network options.

### Network and Digital Connectivity Options:

**FX** – The OPTOCORE fibre network module
- Allows the converter to be used as a part of a 24 device OPTOCORE redundant ring topology network.
- 4 Serial ports - Sync - 2 LAN ports - 2 SANE/LAN ports

**TP** – The SANE Cat5 module
- Allows the converter to be used as a stand alone converter or expansion device for OPTOCORE FX devices.
- 16 AES3 I/O - Word Clock I/O - 1 LAN port - 2 SANE/LAN ports

### Intercom Devices:

- **X6R-INTERCOM-IC422** – 8 Four Wire Clear Com Matrix Ports
- **X6R-INTERCOM-IC485** – 8 Four Wire RTS Matrix Ports
- **X6R-INTERCOM-IC444** – 8 Line Level I/O and GPIO

- **V3R-INTERCOM-IC422** – 4 Four Wire Clear Com Matrix Ports
- **V3R-INTERCOM-IC485** – 4 Four Wire RTS Matrix Ports
- **V3R-INTERCOM-IC444** – 4 Line Level I/O and GPIO

The above combinations are available with FX and TP network modules.

### Connectivity Options:

- **IC422** – ClearCom Four Wire Matrix Ports with Serial Control
  - 4 Four Wire ClearCom Matrix Ports with Line Level and RS422 Serial Inputs and Outputs for ClearCom key panels, matrices and interfaces.

- **IC485** – RTS Four Wire Intercom Ports with Serial Control
  - 4 Four Wire RTS Matrix Ports with Line Level and RS485 Serial Inputs and Outputs for RTS key panels, matrices and interfaces.

- **IC444** – Line Level Inputs and Outputs, GPIO and DC output
  - 4 Line Level inputs and outputs with optically isolated General Purpose Inputs and relay switched General Purpose Outputs.
  - Auxiliary DC outputs to power external circuits.

- **SDI** – 3G/HD/SD-SDI Inputs and Outputs
  - BroaMan’s MUX 22 is a 3G/HD/SD-SDI video I/O unit with built-in CWDM module, analogue or digital audio I/O and data.
  - www.broaman.com

- AES3 based intercom systems can utilize OPTOCORE AES3 ports.
  - Redundant Power Supply and DC input are available as options.
MADI CONNECTIVITY

Twisted Pair MADI:
Twisted Pair MADI is a derivative of the AES10 MADI standard and introduces the use of standard, low cost, CAT5 cabling in addition to Coaxial and Optical connectivity.

Recognizing the need for more affordable options for MADI interconnectivity, the implementation utilizes commonly available components to create a 64 channel audio interface at a price point viable for low channel capacity applications.

Twisted Pair MADI not only fulfills all professional requirements for simplicity, sound quality, low latency, low jitter, but can optionally have the added benefit of Fast Ethernet on the same cable for device control.

Connectivity Options:
M20-FX – 18 Twisted Pair MADI / Ethernet Ports
M12-FX – 10 Twisted Pair MADI / Ethernet Ports
M12-FX – Coaxial MADI Ports
M12-FX – Twisted Pair MADI/LAN Ports
M12-FX –OPT/BNC

4 Optical / 4 Coaxial 64 channel MADI ports routable using the device’s 512 x 512 channel router or to a network connected to the high capacity optical uplink ports.

The M8-FX, M12-FX and M20-FX MADI Switches allow for the use of high capacity, open standard MADI and Fast Ethernet on twisted pair cabling in standalone applications as well as a part of an OPTOCORE network using high bandwidth optical uplink ports.

The devices are designed and built utilizing state of the art digital circuitry for ultimate reliability and operational flexibility.

Network Connectivity Options:
FX – The OPTOCORE fibre network module allows the device to be used as a part of a 24 device OPTOCORE redundant ring topology network.
4 Serial ports - Sync - 2 LAN ports - 2 SANE/LAN ports

FX – OPTOCORE Fibre option
MADI CONNECTIVITY

MADI Series Devices:
- **M20-FX-CAT** – 16 Twisted Pair MADI/LAN Ports
- **M12-FX-CAT** – 8 Twisted Pair MADI/LAN Ports
- **M12-FX-OPT** – 8 Optical MADI Ports
- **M8-FX-OPT** – 4 Optical MADI Ports

OPTOCORE FX devices are additionally equipped with 2 SANE ports that can be configured to be used as Twisted Pair MADI/LAN ports.

The DD2FR-FX and DD4MR-FX allow transparent, high capacity, open standard MADI connectivity to and from OPTOCORE networks.

The devices are designed and built utilizing state of the art digital circuitry for ultimate reliability and operational flexibility.

DD2FR-FX – 2 Optical MADI Ports with analog video

DD4MR-FX – 2 Coaxial MADI Ports with analog video

Network Connectivity Options:
- **FX** – The OPTOCORE fibre network module allows the device to be used as a part of a 24 device OPTOCORE redundant ring topology network.
  - 4 Serial ports - Sync - 2 LAN ports - 2 SANE/LAN ports

FX – OPTOCORE Fibre option

DD2FR-FX – 2 Optical MADI Ports with analog video

DD4MR-FX – 2 Coaxial MADI Ports with analog video

Connectivity Options:
- **DD2FR-FX**
  - 2 Optical 64 channel MADI ports.
  - Composite Video Input and Output.

- **DD4MR-FX**
  - 2 Coaxial 64 channel MADI ports.
  - Composite Video Input and Output.
  - Redundant Power Supplies supplied as standard.
  - DC input optionally available.

DD2FR-FX – 2 Optical MADI Ports with Composite Video I/O

DD4MR-FX – 2 Coaxial MADI Ports with Composite Video I/O
AES/EBU CONNECTIVITY

The DD32R and X6R allow customizable AES3 digital and network connectivity.
The devices are populated at the time of manufacturing with connectivity and network options.
The devices are designed and built utilizing state of the art digital circuitry for ultimate reliability and operational flexibility.

**Network Connectivity Options:**
- **FX** – The OPTOCORE fibre network module allows the device to be used as a part of a 24-device OPTOCORE redundant ring topology network.
  - 4 Serial ports - Sync - 2 LAN ports - 2 SANE/LAN ports

**Connectivity Options:**
- **DD32R-FX**
  - 32 AES3 pairs. Switchable as I/O in blocks of 4 pairs.
  - Composite Video Input and Output
- **X6R-FX-16AE**
  - 8 AES3 pairs. Switchable as I/O in blocks of 4 pairs.
- **X6R-FX-8AE/8MI or 8LI or 8 LO**
  - 8 AES3 pairs. Switchable as I/O in blocks of 4 pairs.
  - 8 channel Microphone input, Line Level input/output module that can be used in place of 4 AES3 pairs.
- **X6R-FX-16AE/SRC**
  - 4 AES3 inputs and 4 AES3 outputs with sample rate converter.

**AES/EBU Devices:**
- **DD32R-FX** – 32 AES3 pairs, Composite Video I/O
- **X6R-FX-16AE** – 8 AES3 pairs
- **X6R-FX-8AE/8MI** – 8 AES3 pairs, 8 Mic Inputs
- **X6R-FX-8AE/8LI** – 8 AES I/O, 8 Line Inputs
- **X6R-FX-8AE/8LO** – 8 AES I/O, 8 Line Outputs
- **X6R-FX-16AE/SRC** – 4 AES3 input with Sample Rate Converters and output pairs

All TP devices are equipped with 16 AES3 pairs assignable to the network, switchable as inputs or outputs in blocks of 4 pairs.
A redundant power supply (standard on DD32R-FX) and DC inputs are available as options.
INTERFACE CARDS

The DD8RP is a four channel Protocol Independent Repeater for standard SFP fibre transceivers.

The device can be used to convert between single and multimode fibre, to transverse between WDM colors/wavelengths or to amplify optical signals.

The BroaMan product range offers a wide variety of solutions for 3G/HD/SD-SDI professional video signals.

The BroaMan Repeat 48 is a modular coaxial-optical converter for 3G/HD/SD-SDI and MADI that can optionally be equipped with WDM multiplexers and auxiliary ports for OPTOCORE.

Learn more at:
www.broaman.com

REPEATERS

The Y3R-TP Yamaha card with SANE allows CAT5 connection to an OPTOCORE FX or TP device.

The Y3R-TP card is capable of 16 inputs and outputs. Multiple cards can be daisy chained from a 64 channel input / 64 channel output SANE port on an OPTOCORE FX device or used in a SANE network.

The Y3R-TP card is capable of transporting and converting the Yamaha HA Remote protocol and Fast Ethernet.

The YG2 and YS2 Yamaha cards allow a redundant fibre connection of a Yamaha mixing console to a 1Gbit OPTOCORE network.

The YG2 card is capable of 64 inputs and outputs and connection to multiple YS2 slave cards.

A YG2 card is capable of transporting and converting the Yamaha HA Remote protocol and Fast Ethernet.

The YG2 – 64/64 Yamaha master card

YS2 – 16/16 Yamaha slave card

The BroaMan Repeat 48 – 3G/HD/SD-SDI, MADI Repeaters

Learn more at:
www.broaman.com
OPTOCORE CONTROL SOFTWARE

The software enables complete control over an OPTOCORE network. It enables access to the patching matrix of all devices in the entire networks and lets you remotely control and monitor connected devices, such as converter modules (gain setting, phantom power, input and output level readings).

OPTOCORE Control

The software allows the configuration of and access to the complete network, audio, data and video MATRIX, the naming and gainsetting of all inputs, the configuration of the word clock settings, the provision of phantom power for all mic inputs, the modification of options, the storage and recall of the configuration set-up to/from PC hard disk, as well as the real-time level display of the individual channels.

Supervising the Network

Working in ON-LINE mode, it is possible to have the complete network under control, the software advises the system manager after every significant event, such as input clipping fiber/CAT5 disconnection, RS232/USB/LAN connection status. A log window will automatically pop up on event, if desired.

Input-output, Matrix and Patch

Any input of the system can be routed to any output by means of the Matrix tab. One input can be routed to more than one output.

RS485 and Video Settings

RS485 and video patch is confirmed by the local setting window, locally or via the network.

Specials

The OPTOCORE control protocol can be used by interested manufacturers or customers to control OPTOCORE devices directly from hardware other than a computer (mixing desks, media controller, control boxes, etc.). This is currently being implemented by various manufacturers, including DiGiCo®, Soundcraft, LAWO, Solid State Logic and Yamaha®, allowing gain/phantom control of analog OPTOCORE devices (LX4, X6, X6R, V3R) directly from their digital consoles.
Events and Tours:
2014 Winter Olympic Games, Opening and Closing Ceremonies – Sochi, Russia
2012 Summer Olympic Games, Opening and Closing Ceremonies – London, UK
2010 Winter Olympic Games, Opening and Closing Ceremonies – Vancouver, BC, Canada
2008 Summer Olympic Games, Opening and Closing Ceremonies – Beijing, China
2004 Summer Olympic Games, Opening and Closing Ceremonies – Athens, Greece
20th World Youth Day – Cologne, Germany
32nd America’s Cup – Valencia, Spain
53rd Annual Grammy Awards – Los Angeles, California, USA
Atp Tennis Masters Series – USA
Barbra Streisand European Tour
Billy Joel & Elton John "Face 2 Face" Tour
Commonwealth Games – Delhi, India
European Song Contest – Belgrade, Serbia
Glastonbury Festival – Pilton, Somerset, UK
Green Day “21st Century Breakdown” Tour
Leona Lewis “The Labyrinth” Tour
New Years Eve in Times Square – New York, USA
Robbie Williams “Close Encounters” Tour
Royal Horse Gala – Qatar
Take That “Progress” Tour
Le Mans Grand Prix – France2012 Divya Jyoti Jagriti Sansthan, India
Kuwait 50th Constitution Day – Kuwait
Coldplay Tour “Mylo Xyloto” – Europe
Punk’d – USA
Carnival – Brazil
Australian Open – Australia
X-Games – France
Permanent Installations:
America Gardens Theatre at Epcot, Walt Disney World – Orlando, Florida, USA
Bastille Opera – Paris, France
Cirque du Soleil, MGM City Center – Las Vegas, Nevada, USA
Deltion College – Zwolle, The Netherlands
Düsseldorfer Schauspielhaus – Germany
First Christian Church – Akron, Ohio, USA
Hard Rock Live, Hard Rock Hotel & Casino – Biloxi, Mississippi, USA
Henan Arts Center – Zhengzhou, Henan, China
Hong Kong Cultural Center – China
Kaufman Concert Hall at The 92nd. St. Y – New York, New York, USA
Kings Place – London, UK
Kölner Philharmonie – Cologne, Germany
Kulturpalast Dresden – Dresden, Germany
New Zealand Parliament – Wellington, New Zealand
Norwegian EPIC Cruise Line – Norway, France, UK, USA
Olympic Stadium – Berlin, Germany
Pittsburgh Hockey Arena, Consol Energy Center Pittsburgh, Pennsylvania, USA
Porto Coliseum – Porto, Portugal
Seacoast Grace Church – Cypress, California, USA
Swedish Theater Helsinki – Finland
The Phoenix Hall – Kyoto, Japan
Würzburg Main-Franconia Theatre – Würzburg, Germany
Wroclaw Opera House – Wroclaw, Poland
Hochschule für Musik Karlsruhe – Germany
Tokyo Theatre Orb – Japan
Oostende Theatre – Belgium
Teatr Rozrywki – Poland
Edinburgh International Conference Centre – UK
Luxor – USA
Emirates Palace – Dubai
Chan Center – Canada
Aarhus Theatre – Denmark
broadcast:
Arena TV – UK
Austrian Broadcasting (ORF), OB Van and recording Van – Austria
British Broadcasting Corporation (BBC) “Type B” van – UK
Berlin-Brandenburg Broadcast (rBB) – Germany
Canadian Broadcasting Corporation (CBC) Radio OB Van – Canada
Canal 9, Valencia Television (RTVV) – Spain
Coronation Street, ITV – UK
DRS Radio recording Van – Switzerland
Hessian Broadcasting (HR) – Germany
Hunan TV – Changsha, China
Jiaxiang TV – China
Media Burst – Portugal
Mediaset OB Van 27 – Italy
NBC Studios – USA
Polish Radio – Poland
Rai 3 Studios – Italy
Saarland Broadcasting (SR) – Germany
Southwest Broadcasting (SWR) – Germany
TeleBaern – Switzerland
The Audio Truck Inc. – Canada
VRT S3 radio van (Flemish radio) – Belgium
Zhejiang Television (ZJTV) OB Van – China
SVF, Sweden
Media City – UK
NRK – Norway
Radio Deejay – Italy
Israel Broadcast – Israel
HSE 24 – Germany
The Voice of Germany – Germany