FIBER INFRASTRUCTURE SOLUTIONS
FOR PROFESSIONAL 3G/ HD/ SD-SDI
VIDEO, AUDIO AND DATA
BroaMan (Broadcast Manufactur GmbH) was incorporated in January 2012 by the founders of OPTOCORE GmbH. The company was founded to apply 20 years of experience in providing high premium fiber networks — enabling high bandwidth audio, video and control infrastructure solutions to be created for the broadcast and AV markets.

BroaMan develops and manufactures a product portfolio that includes simple cost effective converters featuring low power consumption and high density, complete fiber distribution and routing networks as well as systems specifically engineered to the customer’s application.

Using BroaMan’s modular building blocks, the customer can specify topology, system bandwidth, routing, type and location of interfaces as well as any special features required for the application. As a result, the customer will benefit from a fully customized system that perfectly fits the application.

With this approach BroaMan can provide high bandwidth infrastructure solutions for any application — whether it is a complex system for a broadcast studio, an OB unit, or simple point-to-point solutions for churches, performing art centres, conference halls, etc.

BroaMan’s team of Application Engineers provides consultation on system specification as well as training and technical demonstrations.
**DiViNe Technology:**
- Focused on the best transport medium – fiber optics
- Conversion, fiber transport and routing of professional video signals
- Sync distribution and conversion
- Almost no latency – close to the speed of light
- Modular design: analog and digital coaxial I/O, optical I/O, routers, repeaters, optical multiplexers, reclockers and sync generators
- Flexible hardware allows any system configuration and topology
- Network intelligence thanks to built-in Optocore technology and FPGA processing

**Optocore Technology:**
- High-bandwidth fiber-based audio and data routing platform
- Different audio and data formats on single fiber
- Lowest latency on the market
- Flexible and scalable solution
- Integration with 3rd party manufacturers
- Network intelligence
- Advanced software for configuration and monitoring

**Uniquely BroaMan**
- Entirely fiber-based network
- All professionals signals (80 3G-SDI video and thousands of audio channels) and data on single fiber cable
- Up to 80km between two nodes
- Lowest power consumption and latency
- Simple integration with other brands through open standards
- Built to Order as well as off-the-shelf products
- System design flexibility
- Future proof with FPGA technology - free of charge upgrades
- Dedicated Application Engineering team - free of charge consulting
BroaMan provides a platform to route and transport all signals on single fiber:

- Video: 4K-UHD, 3G/HD/SD-SDI, ASI, Composite
- Audio: MADI, AES/EBU, analog, Optocore
- Intercom: Clear-Com and RTS 4-wire, IP and AES3-based intercom systems
- Data: Ethernet, RS485/422, GPIO, MIDI, DMX, CAN-bus
- Sync: Tri-level, Bi-level (black-burst), Word Clock
- Camera SMPTE Fiber Links
- Any 3rd party fiber-based protocol
- All signal transmission is uncompressed with almost no latency – close to the light speed for video. The system is not bandwidth restricted and allows transport of up to 80 3G video signals on single fiber strand

Topology

BroaMan systems can be supplied with or without redundant cabling for use in point to point links, daisy chains, star- or ring topologies.
All BroaMan interfaces are built around three main technology blocks – Media Conversion, Routing and Multiplexing. BroaMan offers a wide range of products - from the basic devices offering only media conversion to the most complex units, which perform routing, media conversion and multiplexing.

**Media Conversion**

- **Electrical-Optical** – signals such as electrical SDI on coax converted to optical fiber
- **Optical-Optical** – one optical signal is converted to another optical signal, i.e. to transverse wavelengths or to regenerate the optical signal
- **Optical-Electrical** – optical signals converted to an electrical interface (such as SDI or MADI coax)

Products offering Media Conversion: Repeat48, Mux22, Route66

**Routing**

BroaMan Routers are 100% protocol independent - it doesn’t matter what kind of data stream comes into the router or at which data rate. The routers do not influence or convert the signal, meaning that on the same router one channel can be 3G-SDI, the next one can be MADI, the third one can be Gigabit Ethernet link for file transfers and the fourth can be Optocore.

BroaMan offers different routing modes:
- **standard crosspoint matrix controlled via Optocore Control Software or 3rd party software**
- **automatic routing** – routing follows the stagebox – wherever you connect the stagebox BroaMan router will automatically patch the assigned channels to/from the stagebox. This simplifies and speeds up the production

Products offering Routing: Mux22, Route66

**Multiplexing**

BroaMan systems offer WDM, CWDM or DWDM multiplexing technology with up to 240Gbit bandwidth on a single fiber strand. Each SDI video channel in BroaMan systems is represented by its own unique wavelength.

BroaMan products allow multiplexing of any 3rd party fiber channels (SMPTE cameras, audio protocols, 1Gbit Ethernet tunnel) when the wavelength is specified by the customer.

Single BroaMan channel can be reserved for a full 2Gbit Optocore stream offering a transport of up to 1024 audio channels, Ethernet, serial data and sync.

Products offering Multiplexing:
Repeat48 WDM, Mux22, Route66, WDM Frame
Connectivity

VIDEO

There are two types of video boards available:

- **IVT** with two 3G/HD/SD-SDI BNC inputs or outputs, which are converted to/from fiber (possible also with link redundancy)
- **MR** with one 3G/HD/SD-SDI BNC input and output and two duplex fiber ports to build an intelligent redundant ring multi drop-off distribution solution

AUDIO / INTERCOM

Single Mux22 can consist of two video boards with 2 to 16 3G/HD/SD-SDI channels in required I/O configuration or single video board with up to 8 3G/HD/SD-SDI in combination with one of the audio/intercom boards:

- **IC422** with 4 Clear-Com compatible four-wire intercom ports with serial control
- **IC485** with 4 RTS compatible four-wire intercom ports with serial control
- **IC444** with 4 Line Level inputs and outputs, 4GPIO and an auxiliary power output
- **ICAES** with 4 AES3 intercom ports
- **FO** with 4 MADI AES10 duplex fiber interfaces
- **BNC** with 4 MADI AES10 coaxial I/O interfaces

DATA / MISC

Each Mux22 offers additional I/O connectivity options:

- Up to 4 CWDM tunnels for auxiliary fiber protocols (i.e. 1G Ethernet, SMPTE311m camera links, intercom Matrix trunk, MADI, Optocore, 3rd party audio protocol)
- VSync – video sync board with selectable format (Word Clock, Black Burst, Tri-Level) and adjustable phase shift
- Optocore board with Fast Ethernet switch, Optocore Fiber Links, SANE Cat5 ports, selectable RS485/RS422 or GPIO interface

WDM

Each Mux22 is factory fitted with the built-in CWDM or DWDM multiplexer which combines all signals into single fiber.

Dimensions

- 1RU (rack unit)
- 483 mm (19") width x 44 mm (1,73") height x 200 mm (7,87") depth
- Weight: dependent on hardware configuration

Applications

- OB Trucks – point-to-point connection between field and truck; interconnectivity between trucks
- Studios and installed video – floorbox for Route66 routing system; point-to-point connection between distant locations
Connectivity

VIDEO AND WDM
Repeat48 family offers:
- up to 24 3G/HD/SD-SDI or 12 duplex MADI channels
- fully modular design – up to 12 dual modules
- each module can be either dual SDI IN, dual SDI OUT or duplex MADI
- factory built 1RU device with 2nd PSU
- Repeat48 WDM – built-in WDM module, aux ports for 3rd party optical interfaces

Dimensions

- 1RU (rack unit)
  483 mm (19”) width x 44 mm (1.73”) height x 200 mm (7.87”) depth
- Weight: dependent on hardware configuration

Applications

- OB Trucks – point-to-point multichannel connection between truck and broadcasting center on single fiber
- Studios and installed video – central, standalone converter which distributes fiber 3G/HD signal to multiple locations – works with 3rd party small converters; point-to-point connection between distant locations with multiple fibers (Repeat48) or reduced number of fibers (Repeat48 WDM)
**Connectivity**

**VIDEO**
Route66 can be built as maximum 40 x 40 matrix with the following I/Os:
- up to 24 BNC-SDI ports for 3G/HD/SD video configured as inputs or outputs with or without reclockers
- up to 20 protocol-independent duplex LC fiber ports – can be used for fiber 3G/HD/SD signals I/O
- up to 36 protocol-independent simplex LC fiber ports – can be used for additional 3G/HD/SD signals I/O

**DATA / MISC**
Each Route66 offers additional I/O connectivity options:
- Each fiber port mentioned in video section is protocol-independent allowing 3rd party stream routing and redundancy (i.e. 1G Ethernet, SMPTE311m camera links, intercom Matrix trunk, MADI, Optocore, 3rd party audio protocol)
- VSync – video sync board with selectable format (Word Clock, Black Burst, Tri-Level) and adjustable phase shift
- Optocore board with Fast Ethernet switch, Optocore Fiber Links, SANE Cat5 ports, selectable RS485/RS422 or GPIO interface

**Dimensions**
- 2RU (rack unit)
- 483 mm (19”) width x 88 mm (3,46”) height x 200 mm (7,87”) depth
- Weight: dependent on hardware configuration

**Applications**
- OB Van, Studio or Multipurpose Hall – Route66 in most situations is a standard video router 40 x 40 with Mux22 or Repeat48 working as remote I/O floorboxes. User can control Route66 crosspoints through Optocore Control software or 3rd party hardware or software
- Studio Complex or Theatre – Route66 can be a component of automatic router system. Inputs and outputs are assigned to the specific floorboxes (in most cases Mux22); routing automatically follows the floorbox location without any additional user control required
- Theatre, Multipurpose Hall, Broadcast Facility – Route66 can work as protocol independent automatic or manual fiber patchbay and multiplexer for 3rd party fiber products – i.e. SMPTE cameras, Digico fiber loop, Optocore, Ethernet

**WDM**
Each Route66 can be equipped with the built-in CWDM or DWDM multiplexer, which combines selected signals into single fiber. It allows single-cable connection of multiple floorboxes in distant remote locations.
Large Route66 systems may consist of external CWDM or DWDM multiplexers which are built in standalone passive WDM Frame.
**Solution**

**Stage / Floor box**
- **1 x BroaMan Mux22** – provides 4 SDI inputs for cameras and 4 SDI outputs monitors as well as intercom connection for RTS panels, 4x LAN for internet and 4 x GPOs to control camera tallies. Floor box connects to OB Van through the standard SMPTE311M cable – uses only two fibers for connection (copper line is still available for other data or power)
- **1 x Optocore X6R-TP-16MI** – provides 16 Mic Inputs which can be directly controlled from Yamaha or other console
- **1 x Optocore X6R-TP-8MI/8LO** – provides 8 Mic Inputs which can be directly controlled from Yamaha or other console as well as 8 Line Outputs for monitoring and mix minus

**OB Van**
- **1 x BroaMan Mux22** – provides 4 SDI I/O to connect video router in the Van as well as intercom 4-wire connection for RTS matrix, LAN for internet and 4 x GPI to control camera tallies
- **2 x Optocore Y3R-TP** – integrates audio system with the Yamaha console. Enables the mic phantom and gain control directly from the sound desk. Mix minus can be sent from the desk back to the stagebox

**Main Advantages**
- System doesn’t require special cabling – standard SMPTE 311m which is used for camera systems can connect OB Van with its stagebox
- All audio and video and intercom channels can be routed through the complete network without bottlenecks or restrictions
- Compact 1RU interface in OB Van – saves space
- No fan in the devices – it can be mounted directly in the sound control area without any noise management or stagebox can be placed directly next to very sensitive microphone
- Direct Yamaha compatibility
- System allows future change of the audio console using the same front end. The same stagebox can be controlled from Lawo, Studer, Soundcraft, SSL and Digico
- Extremely good mic preamp quality
- Simple RTS intercom integration
- One software to control and monitor the complete system
- Highly cost effective and eco-friendly due to the extremely low power consumption
**Solution**

**Halls**
- 1 x **BroaMan Mux22** – provides 4 SDI inputs for all cameras and one output for projector as well as intercom connection for Clear-Com panels, LAN and RS485 to control PTZ cameras (enables different camera types)
- 2 x **Optocore Y3R-TP** – interface cards which fit Yamaha slots and enable routing audio signals between all Halls and Central Broadcasting Room. Y3R cards connected by up to 100m Cat5 cable to the Mux22

**Central Broadcasting Room**
- 1 x **BroaMan Route66** – central router, which connects all Mux22 from all 3 Halls. It is equipped with local SDI I/O to provide local connectivity to vision mixer and playback device
- 1 x **Optocore V3R-FX-INTERCOM** – provides intercom matrix connection to panels which are connected via Mux22 in each hall
- 1 x **Optocore V3R-TP-8LO** - provides 8 local outputs – user can route any signal from any Hall and any Yamaha console to the local loudspeaker
- Computer running Optocore Control application which controls video and audio routing and monitors the network can be connected in the Central Broadcasting Room

**Main Advantages**
- Reduced cabling which saves costs over long distances
- All audio and video and intercom channels can be routed through the complete network without bottlenecks or restrictions
- Compact 1RU interface in each Hall
- Direct Yamaha compatibility
- Simple Clear-Com intercom integration
- Camera control freedom – either LAN or RS485
- One software application to control and monitor the complete system
- Highly cost effective and eco-friendly due to the extremely low power consumption
BROAMAN APPLICATION EXAMPLES

REFERENCES

50th Constitution Day – Live Production, Kuwait
Axel Springer Berlin – Newspaper Publishing
House & Tv Production, Germany
BBC – Broadcast Facility, Scotland
BP- Satellite Solutions – Formula 1 Broadcast, Netherlands
CTV – Broadcast Facility, Canada
Danish Radio – OB Van, Denmark
Fjord Film – OB Van, Denmark
France 24 – Broadcast Facility, France
France Television – OB Vans, France
Friedrichsstadtpalast – Theatre, Germany
ITV Coronation Street – Broadcast Facility, UK
Komische Oper Berlin – Opera house, Germany
LCP Assemblee National – Broadcast Facility, France

Lumiere et Son – Live Production Rental, France
Moya Semya – Broadcast Facility, Russia
Nanjing Radio – OB Van, China
NRK – Norwegian Television OB Van, Norway
Saarländischer Rundfunk – OB Vans, Germany
Shine – Broadcast Rental, Australia
SiS Live – Media City Studios, UK
SUNY Oneonta University – Recording Studio, USA
SVT – Swedish Television Broadcast Facility, Sweden
TV Skyline – OB Vans, Germany
TV2 – OB Van, Denmark
Videohouse – OB Vans, Belgium
WDR Düsseldorf – Broadcast Facility, Germany