OPTOCORE

BroaMan

Case Study
Live Production

50th Constitution Day Celebration, Kuwait City, Kuwait

The 50th Constitution Day of Kuwait took place along 5km of beach in the heart of Kuwait City on November 10, 2012. The final act of the show lasted almost an hour, lighting up the sky with a total of 77,282 fireworks, which broke the Guinness World Record for the largest fireworks display ever.

French-based rental company, GB4D was contracted to deliver the audio and lighting system as well as video transport for what was one of the largest shows in the Middle East to date. The biggest challenge that GB4D owner, Gilles Bouvard, had to face was signal transmission spanning the 5km length of the beach and the problems posed by a sand/water environment. Production had requested sound and light to be delivered to any point along the beach and the only solution for covering such a distance was OPTOCORE, with its redundant fibre based ring topology. OPTOCORE provided not only sound to each of 52 Line Array towers, but also control of amplifiers and DMX lighting.

OPTOCORE audio and BroaMan video units played a key role in Kuwait's extravagant celebration of the 50th anniversary of its constitution.

The OPTOCORE system was not only used at the beach, but also out at sea. GB4D designed a second ring system to provide audio and Ethernet transport to the five cube-shape platforms (20m x 20m x 20m) which were built especially for this show, 400m offshore. Each cube was equipped with lighting, which created a great visual effect. The only way to reach the cubes with control signals was by using fibre.

A new challenge for GB4D was to provide video transport to the multiple screens – two independent SDI channels transported along the beach. Bouvard did a bit of market research and found that only BroaMan offered a perfect solution for his project – a ring topology, which distributes two channels to all remote locations.

As a result Bouvard needed only a 4-core fibre between each location, which saved not only the cost of classic copper cabling, but also assuring the best quality of sound, control and video.

OPTOCORE system components

OPTOCORE System Features:

- long distances on single-mode fiber
- 768 audio inputs, unlimited number of outputs
- DMX and LAN on the same fiber
- matrix and mic gain controlled from one location
- high temperature tolerant

DD2FR-FX
128 fibre MADI I/O OPTOCORE and SANE links RS485, LAN, WC, Video I/O

1 x DD32R-FX
64 AES/EBU I/O OPTOCORE and SANE links RS485, LAN, WC, Video I/O

X6R-FX-8MI/8LO
16-channel converter unit OPTOCORE and SANE links RS485, LAN, WC, Video I/O

X6R-TP
16-channel converter unit SANE links, 32 x AES/EBU LAN, WC, Video I/O

X6P
16-channel converter unit analog - AES/EBU

DD6NE
6-port Fast Ethernet switch OPTOCORE links RS485, WC, Video I/O

YG2
Yamaha miniYGDAI card OPTOCORE links LAN, RS485 ports

BroaMan system components

BroaMan System Features:

- HD-SDI video distribution and routing to multiple distant locations
- LAN for IP cameras on the same fiber
- fiber power budget monitoring
- routing controlled from one location

Route33
configured with
Route33 configured with 1 HD-SDI In,
1 HD SDI Out OPTOCORE module – LAN, RS485
2 x fibre AUX
2 x fibre COM

OPTOCORE Small Ring

The OPTOCORE system for the 50th Constitution Day of Kuwait was based on two rings, running two different protocols. The small ring was used to provide LAN connections to all five platforms on the sea as well as audio signals to the Yamaha 01V96 console which was placed on the fifth platform. One DD32R-FX was installed in the front of house position and provided a connection to the second, bigger ring. The table below provides a detailed setup of the small ring.

OPTOCORE Device	ID Number	Location	Functions
DD32R-FX	1	FOH	Provides a 16-channel bi-directional connection to the Big OPTOCORE Ring as well as additional analog feeds
X6P-8IN/8OUT	–		Provides 8/8 analog channels
DD6NE	2	Cube #1	LAN for light control
DD6NE	3	Cube #2	LAN for light control
DD2FR-FX	4	Cube #3	LAN for light control (spare fibre MADI)
DD4MR-FX	5	Cube #4	LAN for light control (spare BNC MADI)

OPTOCORE Big Ring

The bigger OPTOCORE system was installed on the 5km long beach. The main requirement for OPTOCORE was to distribute audio signals to the L-Acoustics loudspeakers from front of house as well as DMX for lights and Ethernet to control L-Acoustics amplifiers. Loudspeakers were installed in the delay towers 100m apart to cover the whole area with sound. OPTOCORE X6R-FX-8MI/8LO units were installed in every third tower – 20 in total, covering the whole distance. Microphone inputs were very useful when the system was tuned; a short microphone cable connection to the measurement microphone enabled a signal from the microphone to be sent back to front of house for very accurate measurements. Line outputs provided program feed to every loudspeaker. The FOH engineer had complete control over OPTOCORE patching and every input from the console could have been sent to any loudspeaker.

OPTOCORE patching and every input from the console could have been sent to any loudspeaker.

Front of house provided multiple signals from two consoles – the main mix from a Midas Pro6 and additional multiple aux outputs from a Soundcraft Vi6 (one aux per each delay group) — with each console integrated into the OPTOCORE network with a DD2FR-FX. For Midas additional Klark Teknik DN9652 format converters had to be used, since Midas consoles do not support standard MADI protocol. The ring was also equipped with one DD32R-FX unit, which provided an AES connection to the smaller OPTOCORE ring.

GB4D took full advantage of the OPTOCORE 2.21 protocol. The Big Ring provided not only around 500 audio inputs, but was also a

transport platform for all control protocols – DMX and Ethernet-based loudspeaker management system. Each tower was equipped with steerable lighting controlled from an FOH lighting console (OPTOCORE provided DMX transport through RS485/422 ports on each unit). To monitor and control powered loudspeakers, GB4D used the Ethernet switch which is built into the OPTOCORE platform. As a result the overall cable count was reduced to a minimum with just one fibre between each location.

The table below lists all devices used in the Big Ring setup.

OPTOCORE Device	ID Number	Location	Functions
DD2FR-FX	1	FOH	Provides 128 MADI I/O from/to Midas Pro6 console through Klark Teknik DN9652
DD2FR-FX	2	FOH	Provides 128 MADI I/O from/to Soundcraft Vi6 console
X6R-FX-8MI/8LO	3	Spare	Spare X6R-FX-8MI/8LO unit
X6R-FX-8MI/8LO	4	Tower A2	Provides 8 Mic Inputs, 8 Line Outputs, LAN and RS422 for DMX
X6R-TP-8MI/8LO	4.2		Provides additional 8/8 analog channels
X6R-FX-8MI/8LO	5	Tower B2	Provides 8 Mic Inputs, 8 Line Outputs, LAN and RS422 for DMX
X6R-TP-8MI/8LO	5.2		Provides additional 8/8 analog channels
X6R-FX-8MI/8LO	5-22	Towers: B5, C1, C3, D3, E2, E4, F2, F5, G1, G4, G7, H3, H6, I2, I5, J1, J2	Provides 8 Mic Inputs, 8 Line Outputs, LAN and RS422 for DMX
DD32R-FX	23	FOH	Provides a 16-channel bi-directional connection to the Small OPTOCORE Ring as well as additional analog feeds

BroaMan Ring

OPTOCORE was not the only transport system delivered by GB4D. Currently such big productions require an HD-SDI signal to be transported to multiple locations. Video design for the 50th Constitution Day of Kuwait was based on BroaMan video and data distribution system. The Belgian branch of production company PRG supplied all video playback equipment providing two different feeds – one to the huge projectors for three 20m high sail-shaped screens and one feed to eight delay towers. The video signal was distributed over the BroaMan fibre transport platform, with 14 new Route33 units. Each BroaMan unit was equipped with an HD-SDI input and HD-SDI output, four LAN ports, RS485/422 and two duplex COM fibre ports. All the devices were connected by fibre, creating a ring topology similar to OPTOCORE system.

The Control Room was equipped with two Route33 units, providing two video inputs to the network. All other units, distributed to the multiple remote locations on the beach received both signals and it was possible to choose which signal should be routed to the HD-SDI output. As a result two different feeds were routed to the desired locations specified by the show producer, while the system provided routing control from one central location. To ensure the best quality of the show, PRG installed IP cameras at each of the three locations with the sail-shaped screens, so the video engineer had a live-time preview of the distant screen in the Control Room. LAN for the IP cameras was also carried by BroaMan devices, and each unit was equipped with an OPTOCORE frame, where all ports in the system were used to create one big 100Mbit virtual switch.
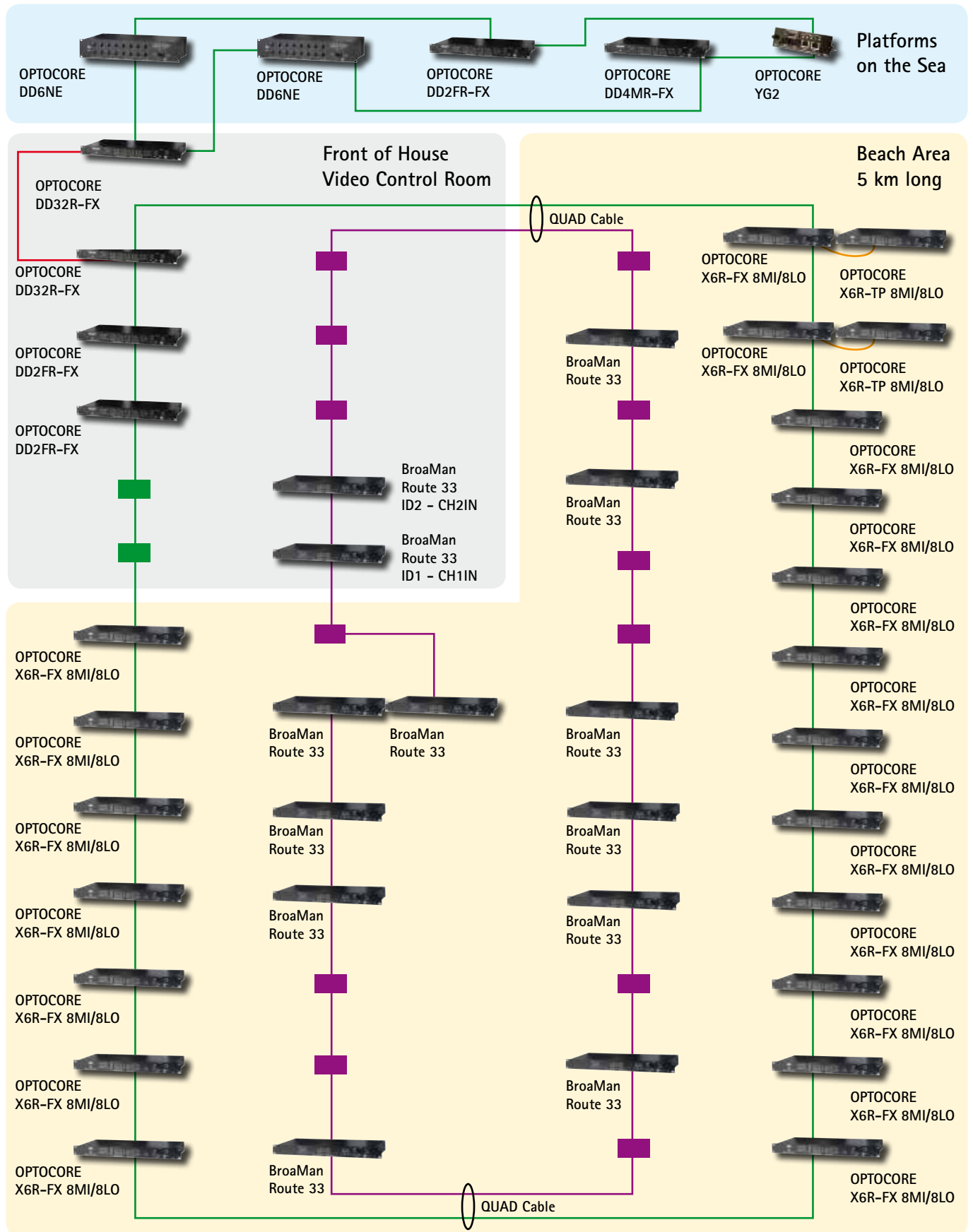

GB4D purchased 4-core fibre cables for the show, which allowed the BroaMan and OPTOCORE rings to share the same cable infrastructure; although the two systems worked independently, the cabling cost was massively reduced.

The table below describes the functions of all BroaMan devices provided for 50th Constitution Day.

BroaMan frame	Hardware Configuration	ID Number	Location	Functions
Route33	1 x HD-SDI IN 1 x HD-SDI OUT 2 x COM fibre TRX OPTOCORE frame	1,2	Control Room	Video Inputs – Ch1 and Ch2 to the system, LAN connection for IP cameras
Route33	1 x HD-SDI IN 1 x HD-SDI OUT 2 x COM fibre TRX OPTOCORE frame	3, 5, 6, 7, 8, 9, 11, 13, 15	Towers: B2, C1, E4, F2, F5, G1, G7, I2	Video output – delay screens – Ch1
Route33	1 x HD-SDI IN 1 x HD-SDI OUT 2 x COM fibre TRX OPTOCORE frame	10, 12, 14	Towers: G1, H6, J1	Video output – "Big Sail" screens – Ch2
Route33	1 x HD-SDI IN 1 x HD-SDI OUT 2 x COM fibre TRX OPTOCORE frame	4	Spare Unit	Spare unit, can be configured to replace any unit above

System Diagram

OPTOCORE
DD6NE

OPTOCORE
DD6NE

OPTOCORE
DD2FR-FX

OPTOCORE
DD4MR-FX

OPTOCORE
YG2

Platforms
on the Sea

OPTOCORE
DD32R-FX

Front of House
Video Control Room

Beach Area
5 km long

OPTOCORE
DD32R-FX

QUAD Cable

OPTOCORE
X6R-FX 8MI/8LO

OPTOCORE
X6R-TP 8MI/8LO

OPTOCORE
DD2FR-FX

BroaMan
Route 33

OPTOCORE
X6R-FX 8MI/8LO

OPTOCORE
X6R-TP 8MI/8LO

OPTOCORE
DD2FR-FX

BroaMan
Route 33
ID2 – CH2IN

BroaMan
Route 33

OPTOCORE
X6R-FX 8MI/8LO

BroaMan
Route 33
ID1 – CH1IN

OPTOCORE
X6R-FX 8MI/8LO

OPTOCORE
X6R-FX 8MI/8LO

OPTOCORE
X6R-FX 8MI/8LO

BroaMan
Route 33

BroaMan
Route 33

OPTOCORE
X6R-FX 8MI/8LO

OPTOCORE
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X6R-FX 8MI/8LO

BroaMan
Route 33

OPTOCORE
X6R-FX 8MI/8LO

OPTOCORE
X6R-FX 8MI/8LO

BroaMan
Route 33

QUAD Cable

OPTOCORE
X6R-FX 8MI/8LO

—— BroaMan, two fibre cores

—— SANE, Cat5 cable

■ BroaMan duplex coupler

—— OPTOCORE, two fibre cores

—— AES/EBU 16/16 channels

■ OPTOCORE duplex coupler

OPTOCORE GMBH

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