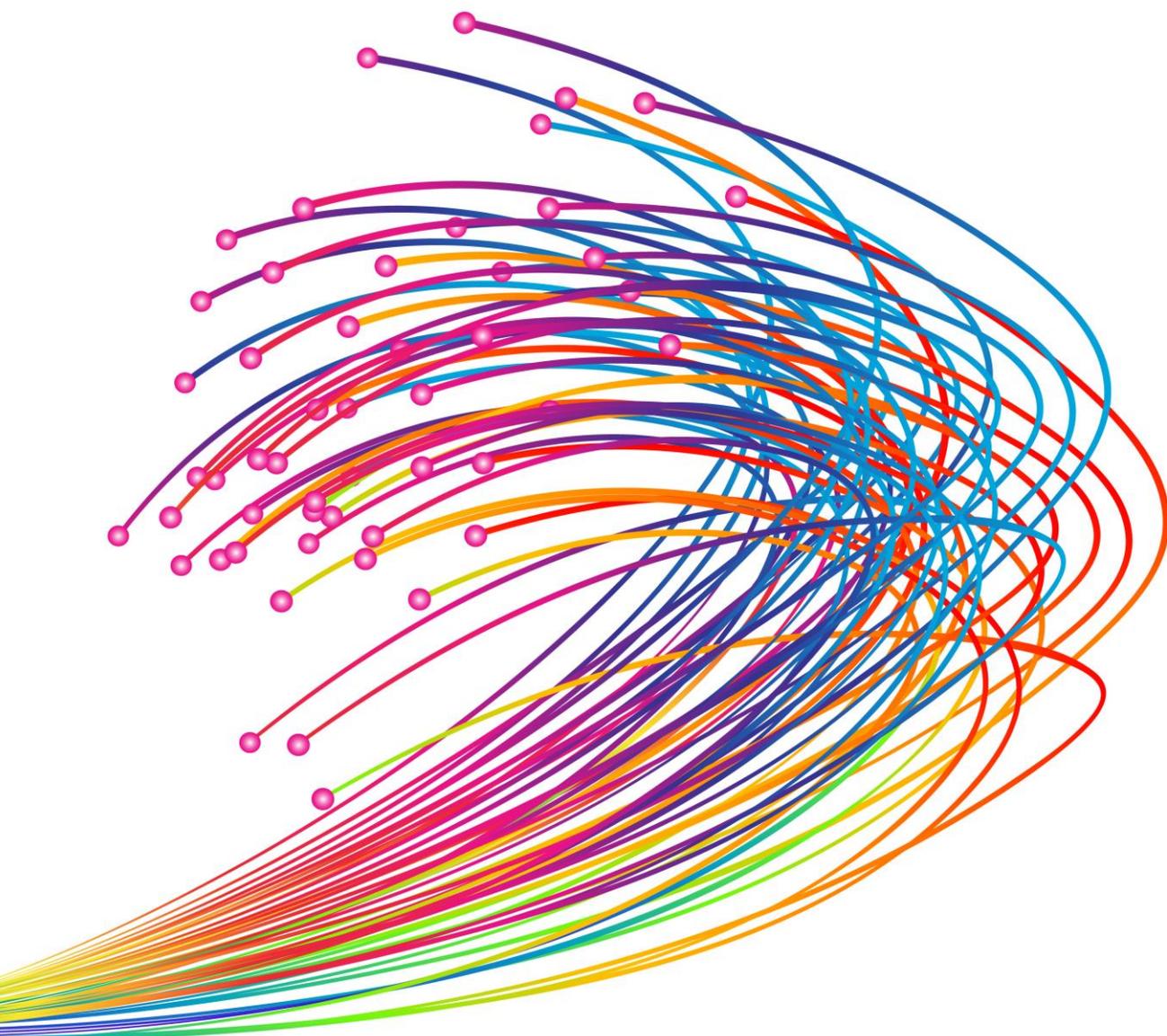


NRK RING NETWORKS

“We can go live with just a few minutes’ setup and we have achieved 100% availability since launch.” - Erik Hansen, NRK



norw|a

miniHUB

Customer Experience

Executive summary

Faced with both growing requirement for live outside broadcasting and concerns over reliability and cost of both microwave and satellite links, the Norwegian Broadcasting Corporation (NRK) developed a fiber ring architecture for video transport across Oslo. The use of the innovative Norwia miniHUB solutions with its AutoSFP cards has enabled a highly resilient and redundant transport of video and data to each node across the metropolitan fiber network with site bypass in case of power outage and the flexibility to add signals, drop signals and pass through signals onwards at each node. Through a single configurable card within the miniHUB deployed at each node, NRK has expanded on the initial project to include remote production of sporting and cultural events while reducing setup-times, complexity and cost of its live productions. Nearly 4 years since deployment, the Norwia miniHUB optical equipment has delivered 100% availability

The customer

NRK, Norsk rikskringkasting AS, more commonly known as Norwegian Broadcasting Corporation, is the Norwegian government owned TV and Radio public broadcasting company. NRK was founded in 1933 with a predecessor private company dating back to 1925. NRK today has 3 HDTV channels and 3 FM radio stations - NRK1, NRK2, NRK3, NRK P1, NRK P2 & NRK P3 – that can be accessed throughout Norway. Specialized services like Jazz, Classical and Folk radio programs are available on internet radio, 14 DAB channels and DVB-T.

NRK has 15 regional stations with broadcasting facilities and four large production centers in Oslo, Bergen, Trondheim and Tromsø. NRK has also pioneered remote production and has outside broadcast facilities. NRK is a founding member of the EBU and has always been admired and respected as a leader in system design with a reputation of often being the first to use innovative new products and technologies.



For live events like the Eurovision song contest and breaking news stories, NRK traditionally used microwave and satellite uplinks to relay content to its Master Control Room (MCR). However, these options were problematic due to the lengthy setup time, high running costs and technical line-of-sight challenges posed by the increasingly built up metropolitan area. Instead, the broadcaster decided to build an optical video and data network that could be used for SDI, IP and file transfer access to archives back at the main station. The dual optical rings, one for news related work and another for event services would encompass the entire Oslo area and cover 12 key sites including the main government buildings, police station and performance venues.

NRK wanted both ring networks to pass through all sites along with its main MCR and backup site. To ensure the highest levels of reliability, all sites had to be 'On-Air' and running simultaneously over a single fiber for each network in an East/West backup configuration. NRK wanted to be able to inject and drop signals at any point within the ring structure while keeping fiber continuity in case of any optical or power outage at any site. The event service ring would be two portable nodes that could be taken to any site within the 12 nodes and be deployed to provide live, bi-directional services between the MCR while serving ancillary tasks as the setup of local production offices. The news ring would have the same protection principles but would have live nodes across the entire ring infrastructure. With this design, anyone could connect instantaneously for live reporting of events in the field.

In terms of critical optical equipment for each site, NRK needed devices that were simple to operate for the reporters in the field, with minimal components to offer simplified serviceability, extreme levels of reliability with a low capital cost of implementation.

The decision

NRK was looking for a partner that combined a deep understanding of optical video transport with an innovative solution set to work with NRK to design and implement a ring structure to meet its demanding requirements. As Mr Erik Hansen, Project Manager at NRK explains of the selection of the optical equipment: "There was a formal tender and we evaluated a number solutions based on a scoring criteria including the use of standards, flexibility and cost. We also looked at the supplier pedigree and we were keen to work with a company that had long term viability to ensure that we would have access to technical expertise moving forward."

Mr Hansen wanted the best solution presently available, so did not score Norwia higher because they were Norwegian, he added: "The team at Norwia were extremely knowledgeable, and the products scored highly against our criteria. What proved one of the deciding factors was the extensive work they had done with American football league stadiums which gave us confidence in its solutions and long term prospects."

After consideration Norwia was chosen to be that partner that undertook the challenge as product supplier and consultant to this major network ring structure project.

“This Norwia miniHUB optical transport system is unique,” says Mr Hansen, “it’s incredibly powerful and flexible, meets all our requirements but uniquely also strips out complexity, to make day-to-day management incredibly simple. We think it’s quite ingenious the way Norwia conceptually makes all components identical for multiple signal formats but also allows multiple configurations. This reduces unique individual functions down to 1 card for most of the system.”

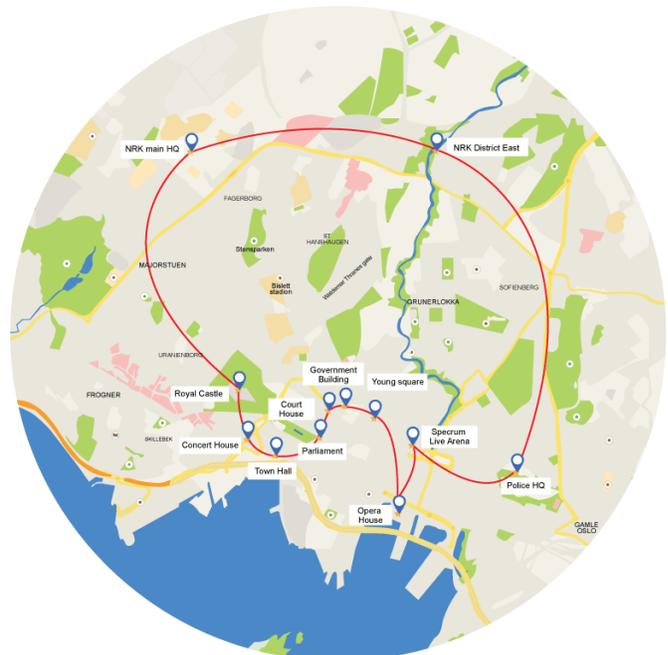
“For NRK that means that maintenance is simplified, operating costs are reduced and we have the flexibility for future change. In addition, the simplicity meant that the overall system cost was lower with Norwia than other solutions on the market.”

The decision relied heavily on a detailed planning stage of the project during which Norwia could demonstrate concisely the technical and optical parameters required for the ring structure. Norwia were able to provide a system design that didn’t require amplification at the nodes, which not only reduced cost but also added reliability through less equipment and potential points of failure. Another key Norwia differentiator was the ability to eliminate proprietary TDM multiplexing technologies, which only add another layer of complexity, decreasing the MTBF (mean time before failure) for the system without giving any discernible benefits.

The Solution

Each News Node:

- miniHUB 1RU chassis w/redundant psu x 2
- OC-4B-SDI optical card x 8
- CWDM optical TX and RX components, Quantity depending on signal numbers
- Optical change-over card x 1
- 2-way Optical Splitter x 1
- CWDM – Ultra low loss filters x1



12 Nodes total in News ring structure

Event services Node:

- miniHUB 1RU chassis w/redundant psu x 2
- OC-4B-SDI optical card x 8
- CWDM optical TX and RX components, Quantity depending on signal numbers
- CWDM – Ultra low loss filters x1

2 portable systems + 2 systems in OB-vans. Node at Master control.



Solution overview

The system is built mostly from one highly auto configuring card module called the OC-4B-SDI. The OC-4B-SDI has Norwia's proprietary AutoSFP™ technology and gives multiple configurations depending on the user's needs, such as ring structures with redundancy features built-in.

Each node in the NRK metro ring network consists of multiple channels that act as pass circuit for relaying signals from one point to another. The module can also be used to drop signals off at one or many sites in the ring structure or to inject signals at a particular site and return these signals back to the master control. The layering of signals is via optical multiplexing at the wavelength layer on a single fiber.

When a signal is injected, the same card can split this signal in two directions to create the diversity redundancy in case of any fiber failure. While at the receiving end both of these signals are again processed by the OC-4B-SDI on a signal level for redundancy per channel. This means that individual signals are protected as well as having received signal on individual SFPs to deliver the highest levels of redundancy.

Included in the ring network is a 10G Ethernet layer that is also redundant throughout the network. This network is used to provide data services for control signals, file access for remote editing, IP transport and miniHUB status and ring master access.

Norwia's wide band optical change-over, OX-2O-2X2 card module was used to provide continuity of the fiber circuit at a node level. If a site had total power outage, then the fiber circuit would retain continuity and still pass signals in both directions of the ring structure.

Every frame in the system is connected via the RCONmini frame manager. The information is presented in an easy viewable interface that can simplify routine management of the individual components of the system. A recent development has been the introduction of a customized interface called 'Ring Master'. This is an intuitive graphical interface of the individual fiber rings, enabling parameters such as attenuation to be monitored for each node in the ring plus indication of signal injection points with in the fiber ring. Ring Master provides a complete one-screen overview of the entire fiber system.

The second ring in the metro network caters for events such as concerts. Instead of fitting the ring structure with fixed full access points it was decided to provide two mobile units that could be deployed when needed. The mobile units are simply inserted into the fiber path. The mobile units are total independent and signals are received back at Master control.



The flexibility of the miniHUB solutions opened many doors when it came to system configuration and alternate design decisions. Having such flexibility meant that configuration could be changed after purchase, removing the traditional requirement to send components back to the manufacturer to introduce new functionality.

When it comes to expansion in the future the miniHUB system can simply be expanded in a layer concept to allow for more capacity. Also, channels that were used for SDI can be easily changed to accommodate an extra data ring structure if needed or an SDI channel could be set up for remote production.

The result

With the ring now operational, NRK has had significant time to assess the value it offers to its live broadcast and the role played by the Norwia optical equipment.

“Compared to the old method of microwave and satellite with an hour lead time for setup and costs of up to 10,000kr per use, the ring is a much better solution,” explains Mr Hansen, “We can go live with just a few minutes’ setup and we have achieved 100% availability since launch.”

Yet the benefits of choosing the flexible miniHUB optical distribution system have gone further than were initially planned. For two recent events, the Oslo Marathon and Oslo Opera House rooftop recital, NRK has used the miniHUB optical distribution for remote production include camera control and intercom function. “The design of the Norwia equipment means that our in-house team can quickly adapt it for these types’ of situation and the technology has proven absolutely reliable across every OB situation,” said Mr Hansen.

The miniHUB is an elegant solution that that has delivered against expectation and gone further thanks to its flexibility and cost effective approach that has added to the value from day one. NRK has reaped the benefits of the reduction in maintenance cost due to having minimal spare cards in the system and a simplified architecture. Reliability is increased through this approach and NRK will see the benefit of the upgradability of the Norwia solutions as time progresses.

Mr Hansen concluded: “We are exceptionally happy with the Norwia miniHUB optical distribution system and the process leading up to implementation of the ring structure in Oslo. The quality of miniHUB product support and service is second to none, which is why we continue to support Norwia’s highly innovative solutions.”

Reflecting on the project, Lars Erik Eriksen, Chief technical officer of Norwia added, “The NRK fiber ring project was a great technical achievement and showed the power and diversity of the miniHUB optical transport system when used in a ring structure. Close attention was paid to budgets and the use of quality optical product to eliminate the need for optical amplification has delivered exceptional reliability. We worked close with NRK to achieve a world class result and we all are very happy with the exceptional outcome and look forward to future collaboration with NRK.”

About Norwia

Norwia is a hi-tech broadcast media equipment manufacturer with a mission to produce products of outstanding value and holds the brand name miniHUB™. Products are developed and manufactured in Norway and marketed globally. Norwia believes in placing the customer as number one as we take our industry knowledge and track record of innovation to the market.

Please visit our website www.norwia.no

About NRK

NRK leads the broadcast television and radio market in Norway. Innovative programming such as 'Slow TV' gained significant rating and the longest running radio program in the world that

started in 1924 are milestones in the NRK history pages. NRK has mandated to be a world class content producer and 9 out of 10 Norwegians use services provided by the broadcaster on a daily basis.

Please visit www.nrk.no