

Ensuring Mission Critical Communications in Tunnels



Tunnel operators, public safety and security agencies need reliable communications to manage emergency events such as fire, major accidents and terrorist attacks in tunnels

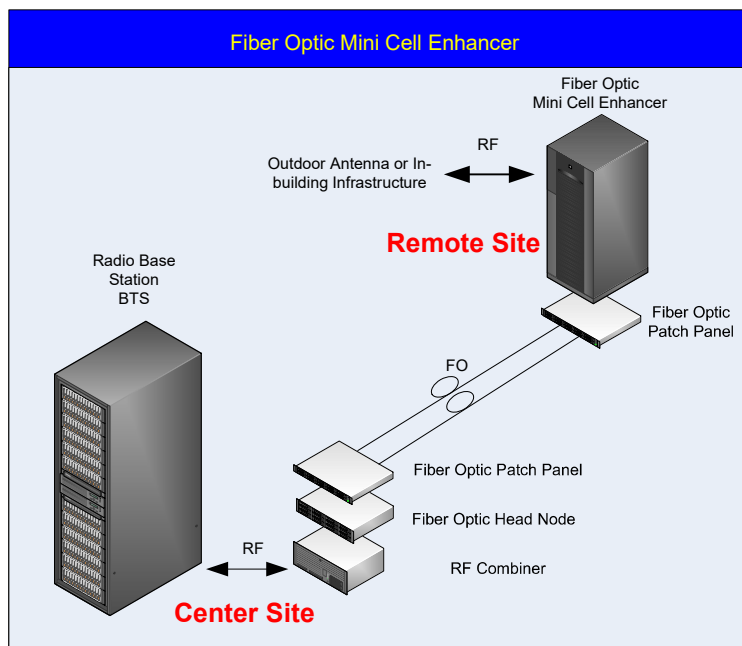
Tunnels, whether for road or rail, are a key part of the transport infrastructure in any country, serving to connect places in the most direct and efficient manner or simply to overcome natural obstacles such as bodies of water, hills and mountains.

Communication needs of Tunnel Users / Stakeholders - To keep the tunnels operating safely and efficiently for all users, reliable 2-way communications must be provided to the following stakeholders along the full length of the tunnel:

- Tunnel operators for traffic control and incident management through the provision of a Re-Broadcast and Break-in System (RBBI) replacing entertainment with real-time voice or prerecorded emergency announcements over commercial radio channels
- Various Operation & Maintenance teams for inspection, repair and maintenance of mechanical, electrical, communication and electronic systems installed in the tunnel
- Emergency services such as fire and rescue, medical services etc.
- Security services responding to incidents in the tunnel or transiting through on their way to other incident sites

Ensuring Mission Critical Communications in Tunnels

Support of multiple radio technologies over wide frequency bands - The communication needs of the various stakeholders are usually fulfilled through a myriad variety of radio system technologies spanning different frequency bands, such as FM broadcast, analogue FM radio, Tetra, Tetrapol, LTE and P25 spanning VHF and UHF bands from 30 MHz to 3GHz. In addition, to propagate the RF signals over the full length of the tunnel may require the use of an auxiliary RF distributed antenna system comprising typically of Leaky Coaxial Cables (LCX) and/or antennas, along with transport of the wideband RF signals over long distances to strategic locations in the tunnel, where the RF signals are boosted and injected into the antenna system.



Key Features of Fiber Optic Cell Enhancer System

- Long range (25km) and wide frequency range (30 MHz - 3GHz)
- Support of multiple radio technologies, analogue and digital
- Simultaneous transmission and reception
- Outdoor rated (IP65 or IP66), fan free optical repeaters
- Choice of RF power output from Low to High
- Remote monitoring and control
- Optional Re-Broadcast & Voice Break-in System (RBBI) for commercial FM

Transporting Multiple Wireless Services in Long Tunnels & Large Underground Complexes - The KMD Fiber Optic Cell Enhancer system combines long range operation (up to 25km) with wide RF bandwidth and choice of RF power (from 1 to 100W per channel) to deliver multiple wireless services to all areas covered by the distributed antenna system. It employs RF to Optical conversion and all remote optical repeaters are outdoor rated (IP 65 or IP66), fan free and natural air cooled to improve reliability and reduce maintenance requirements. The large bandwidth of 30 MHz to 3 GHz enables multiple wireless services ranging from FM broadcast, analogue radio, Tetra, P25, LTE etc. for entertainment, traffic & incident management, operation & maintenance, public safety and security communications to be transported and distributed, maximizing the use of RF infrastructure to provide reliable communications inside the tunnels and underground complexes.

KMD specializes in the design, manufacture, supply, installation, test and commissioning of Fiber Optic Cell Enhancer system, RBBI system, multi-band off-air cell enhancers and boosters for the transport and distribution of commercial FM broadcast, bi-directional analogue and digital radio systems in road and rail tunnels, in-building and large underground complexes. Our products are field proven, with installations in a number of tunnels and underground stations in Singapore. We are also the official distributor of BHE Bonn Hungary Electronics and Sinclair products covering a wide range of RF accessories and antennas, critical communication solutions, satcom subsystems, telemetry transceivers and microwave defence solutions. Contact us for your RF communication needs today!

Fiber Optic Mini Cell Enhancer

Specifications:

FMC Electrical Specifications:

Models	FMC-380-1	FMC-380-5	FMC-380-10	FMC-380-50	FMC-380-100	MCE-100
Frequency Ranges	380~490 Mhz					
Nominal Impedance	50 ohm					
Minimum Return Loss	-18 dB					
Maximum Output Power (per channel)	1 Watt	5 Watts	10 Watts	25 Watts	50 Watts	100 Watts
Gain	50~80 dB (specified before order)					
Connector Type	N Type, Female					
Power	110/230 AC, 5A max.					

FMC Mechanical Specifications:

Dimension (LxBxH)	760x650x400mm or 18U, Standard 19" Rack
Weight	60 kg

FMC Environmental Specifications:

Operating Temperature	0~+55 °C
Humidity	95% non-condensing

Head Node Electrical Specifications:

Models	HN-1	HN-2	HN-4	HN-8
No of FO Channel	1	2	4	8
No of RF Tx/Rx Port	1/1	2/2	4/4	8/8
LED Wavelength	1310nm			
LED Output Power	>1mW (0dBm)			
Max LED Input Power	2mW			
Optic Receiver Sensitivity	-22dBm (Typ.)			
Fiber Connector	SC/APC			
Combiner Input Level	0~-20Bm	3~-17dBm	6~-14dBm	9~-11dBm
Combiner Return Loss	< -18dB			
Combiner Connector	N/SMA/UHF (specified before order)			
Power	110/230 AC, 2A max.			

Head Node Mechanical Specifications:

Dimension (LxBxH)Standard 19" Rack	3U	6U	6U	9U
Weight	25 kg max			

Head Node Environmental Specifications:

Operating Temperature	0~+55 °C
Humidity	95% non-condensing

Network Management: 1. Standard IBM compatible PC with Windows OS.
2. System Monitoring Via modem/IP/GSM .