Different Communication Systems in Tunnels

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Communication Systems for Tunnels

Leaky Feeder

Wi-Fi
Leaky Feeder

Provides a high quality, two way voice communications to underground projects. The leaky coax antenna allows the use of a variety of digital and analogue radios from all major radio manufacturers, such as Tait, Motorola, iCom, Kenwood and others.

Diagnostics

Software that controls the failures of the system and check the amplifiers status in real time.
Leaky Feeder – Digital Upgrade
Leaky Feeder – Digital Upgrade
Wi-Fi = Communications & data transfer
The Wi-Fi technology suite is designed to lead tunneling communications and digital network infrastructure into the future. The Wi-Fi infrastructure has been specifically developed for the tunneling and mining industries to operate within the harsh environments encountered in all underground operations.

- POWER OVER ETHERNET (POE) SUPPORT CAPABILITY
- PORTABLE WIRELESS NETWORK ELEMENTS
- OPERATES ON TOUCH VOLTAGE
- MULTI FUNCTION DEVICE WITH TAG READING ABILITY
- “PLUG AND PLAY” SYSTEM
- MANAGED ETHERNET NETWORK SUPPORTING QOS, SNMP & VLANS
- GIGABIT BACKBONE

2.4 GHz
Wi-Fi Platform -- Impact System

- **Impact**
  - Components
  - Applications
  - System Control
  - Software
Wireless Network Switch
Software

Alarm and event monitoring
Wi-Fi Platform -- Impact System

Components → Impact → Software → System Control → Applications
Voice Communication

- Private Conversations
- PTT
- Groups
- Emergency broadcast channels
- External calling
Tracking Systems

- Breach Site Rule
- Distribution Site Rule
- Out of Range Site Rule
- Motion Stop Site Rule
Access Control

Traditional Tagboard

MST Access Control

Electronic Tagboard
Access Control
SOS – Emergency Call Points
Wi-Fi Platform -- Impact System

- Ventilation on Demand
- Gas Monitoring
- Tunnel traffic Control
- Pumps Control
- Lighting
Mesh Networks

Do we need fiber optic to have Wi-Fi in the tunnel?
Do we need fiber optic to have Wi-Fi in the tunnel?


Requirements

WLAN AND CELLULAR PHONE SIGNAL REPEATER

A. Furnish and install WLAN router and access points within the tunnels, tunnel boring machines, and launching shafts to allow access to the internet at any locations within the tunnels and the launching shaft during construction.

B. Furnish and install Cellular phone signal repeater within the tunnels and tunnel boring machines to allow usage of cellular phone inside the tunnels during construction.

C. Both the WLAN equipment and Cellular phone signal repeater shall have capacity to allow no less than 10 simultaneous connections from equipment of Department personnel that can utilize WLAN and/or Cellular phone service.

D. Both the WLAN equipment and Cellular phone signal repeater shall have backup power to provide continuous operations of the equipment for no less than 2 hours.

E. The WLAN network shall be secured using WPA2 + AES.

F. Remove all WLAN and cellular phone signal repeaters when all tunnel activities are finished.
Requirements

Wireless Local Area Network (WLAN) and Cellular Phone Signal Repeater

1. WLAN access points and router shall transmit and receive signal conforming to the requirements of IEEE 802.11a, 802.11n, and 802.11ac. Access points and router equipment shall be certified by the Wi-Fi Alliance.

2. Cellular Phone Signal Repeater shall receive and transmit 4G and 4G LTE cellular phone signals from cellular phone carriers AT&T, Sprint, T-Mobile, and Verizon.
Underground Classification: The Department has obtained the State of Industrial Relations Division of Occupational Safety and Health, Mining and Tunneling Unit, Underground Classification Permit and for the project, which are included in the documents. Conspicuously post the classification at the construction site. The classification is “potentially gassy with special conditions.”
Benefits of having Wi-Fi in the tunnel

1) Save Time – Improves Communication and collaboration
2) Analysis
3) Automate Administrative Tasks
4) Increase Visibility and Reduce Risk
5) Improve Accountability and Mitigate Disputes
6) Use of Apps on smart phones and tablets
7) Monitoring
Recommendations

✓ Plan ahead and consider long term needs
✓ Number of people and scope of works
✓ TBM with fiber optic, Wi-Fi is the most cost effective solution
✓ Data transfer, tracking etc.
THANK YOU

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