Improving Communications in Underground Mining

Norphonic

Fabrikkgaten 10
N-5059 Bergen
Norway

Telephone : +47 55 62 75 20
Fax : +47 55 59 05 16
info@norphonic.com
www.norphonic.com

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Introduction:

Improving Communication Systems in Underground Mining for Efficient Search and Rescue in Case of Disasters

Fact 1. The ability to summon help in case of emergency depend on your ability to communicate effectively.

Fact 2. At the the time of your accident, your chance of survival is pre-determined by the effectiveness of the comms technology provided.

► In this presentation:

- ► Trends in underground mining communications & emerging developments
- ► How to achieve redundant communications
- ► Automatic System Checks and Fault Alarms
- ► Critical issues to take into account when designing an underground communications system
- ► Achieving Total Site Security - a systematic approach

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Introduction to Norphonic Heavy Duty VoIP Telephones

► Norway -One of world's most mountainous regions

► A lot of tunnels in Norway, both through mountains and below sea level, including the world's longest road tunnel "Lærdal" at over 24 kilometres (15.23 mi) long.

► Norphonic has experience with emergency communications in over 350 road tunnels.

► Developed emergency VoIP products since its infancy, aimed at extremely harsh tunnel environments.

► Products distributed in major mining locations

"Norphonic are experts on VoIP communications inside tunnels.

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Introduction:
About Norphonic

Part of the Malthe Winje Group:

► 14 Daughter companies worldwide

► Manufacturing a wide range of industrial products

► Based in Bergen, Norway

► Founded in 1922

Automation products and systems

Electrical equipment and components

Building development

Learn more at:
► www.norphonic.com

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Telephones for Emergency and Industrial Areas

► Transport (road, rail, air)

► Underground Mining

► Energy production

► Utilities

► Manufacturing and construction

► Commercial (sports stadia, banking, retail)

► Military and Defense

► Local government

► ..and more

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Frequently Asked Question:

"How can mining companies improve communications underground using the latest fiber optic communications technology?"

History of Fiber Optic Communications

► Fiber Optic Network communicate by sending signals down hair-thin glass or plastic fiber cables (ie VoIP travel by speed of light).

► Developed by the large R&D labs 30 years ago & first installed in Chicago in 1976.

► By the mid-80s, fiber was replacing all the telco copper, microwave and satellite links.

► In the 90s, companies discovered they could offer phone and Internet service on that same fiber and greatly enlarged their markets.

► Computers and LANs started using fiber about the same time as the telcos. Industrial links were among the first as the noise immunity of fiber and its distance capability make it ideal for the factory floor.

► Today fiber optics is the <u>dominant medium for every comms system</u>.

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Today: Latest Tunnelling / Mining Developments

► Most new / modern technology today is run on Data Networks, known as "fiber optic" networks.

► IE: Ventilation fans, conveyor belts, fire detection equipment, signals, telecommunications, access control (locking), tracking and remote video surveillance are often today controlled via data networks

► Power can be delivered by Ehternet (PoE = Power over Ethernet)

► Running equipment on Data Networks means less cabling, more functionality, and better control of equipment

"VoIP telephony represents a billion market in which analogue is being rapidly displaced by modern networked technology, known as VoIP telephones"

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How to achieve effective comms underground?

► The safety of a miner working underground depends on his ability to communicate effectively

► This means that the communications technology need to be:

  ► **Reliable**

  ► **Redundant**

What do we mean by "Reliable Communications"

▶ Need to keep working in extreme environments

▶ Approved to international safety standards

▶ Ingress Protection rating to IP65 (water and dust proof)

▶ Ability to withstand extreme temperatures

▶ Heavy duty casing and material (vandal resistant)

▶ Condensation proof

▶ Hookswitch with no moving parts

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Reliable Communications

▶ The mining worker need to know that the telephone is working <u>BEFORE</u> he tries to reach it *(This means that the phones should be fitted with automatic fault checks and system reporting on: link status, handset on/off, conditions of telephone components, microphone etc)*

▶ Remote Monitoring and System Control functionality allows central control staff to fix faults before they become a health and safety issue in an emergency situation.

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Sound Quality

► No matter if you use VoIP or Analogue phones, the sound need to be good.

► The mining worker need to be heard in often very noisy areas

► Sound recommendation; Mean Opinion Score (MOS) = above 4.

► Look for "ToS" - Type of Service, and "QoS" - Quality of Service functionality

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What do we mean by "Redundant Communications"

► Redundancy = A back up in case the first line is broken

► Schematic to right: Allows Optimal Time to recovery (MTTR)

► Less than 30 second recovery in case of network failure

► Recommend max 20 phones in each ring, due to MTTR and also RSTP limitations

► Excellent overall degree of fault-tolerance

► A fully redundant system with RSTP support

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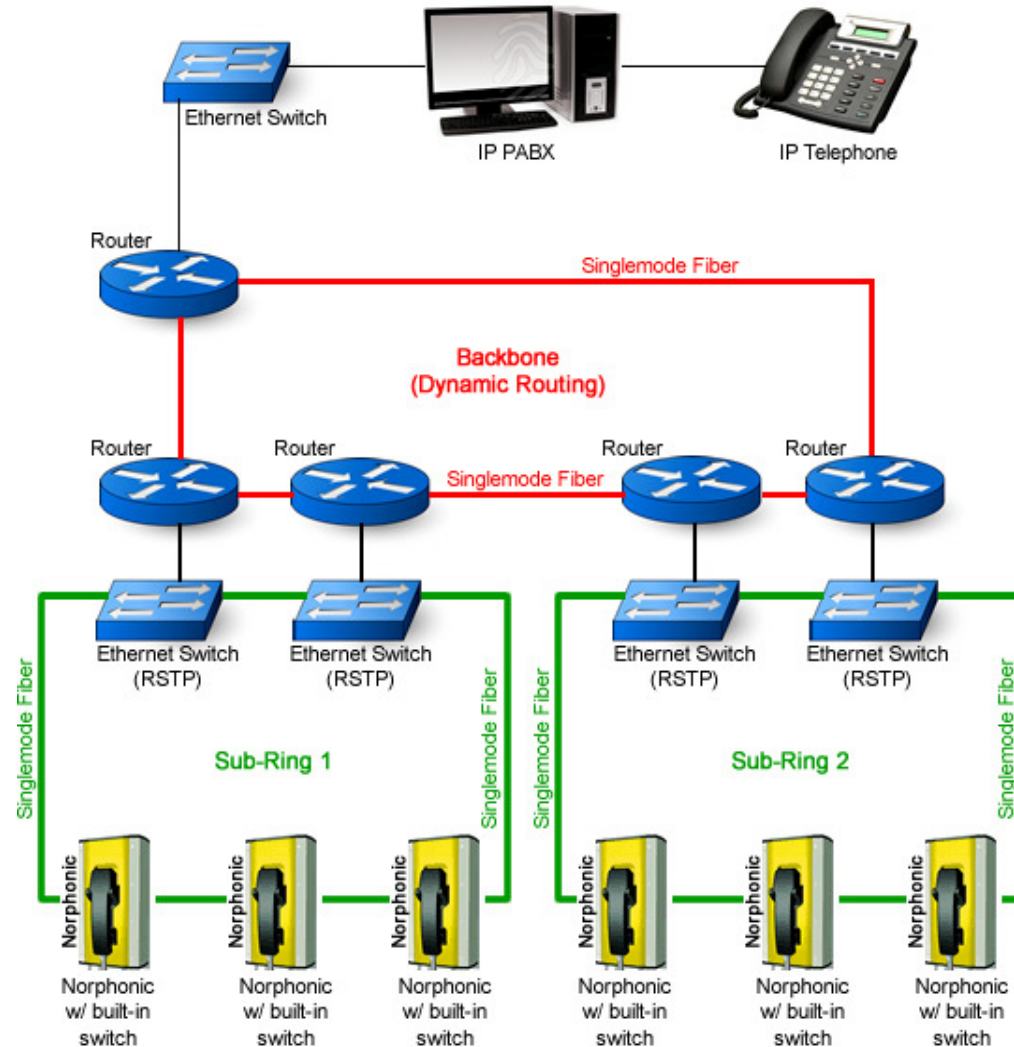
Frequently Asked Question:

"Why don't mining companies install new comms technology?"

Mining Companies - Slow to adopt new technology

► Under pressure to keep costs low

► Little available funds to put towards safety

► Often old legacy systems in place

► Keep on investing in "old" technology

How to achieve effective comms underground?

► VoIP is more flexible when it comes to network installation and topology

► You will pay less for infrastructure costs

► No need to hire a certified electrician because network phones can be powered via Ethernet

► Adding more VoIP phones to the system is simple because there are no hard increments to worry about

► Cheaper when it comes to maintenance and surveillance of system (including automatic monitoring and fault checks)

► Easier to install (software update, commissioning etc).

► Remote monitoring and control functionality

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Frequently Asked Question:

"What are the key issues to be aware of when investing in new VoIP Technology?"

Issues to be aware of

► Future Proofing

"Will the technology be around in 10 years time?"
"If I need to make dramatic system changes in the future, is this possible?"

► Level of Service

"Will I get help if I need technical support?"

► Local Presence

"Can I get spare parts & replacement units quickly?"

► Experience

"Can I get good factual advice from someone with mining experience?"

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Future-Proofing

► Base your system on <u>Open Standards</u>: SIP (VoIP) Protocol: RFC3261

► Use PBX / telecom switchboards that support SIP (Alcatel, Cisco, Asterisk, Switchvox, Pingtel, Sipgate, Siemens etc)

► Check if the system offers Modbus UDP, TCP and SNMP for remote control

► Make sure to get Quality of Service (QoS), Type of Service (ToS) = good sound

► Future proofing means that you are free to change parts of the system at a future date, without loss to the level of functionality or service.

► Avoid Proprietary Systems whenever possible. Proprietary solutions will end up costing you more & if you buy it, you are stuck with it.

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Service, Experience & Local Presence

► Look for Local Service and Support Teams

► Look for Local supply offices & warehouses, stocking spare parts

Concept introduction:

"Total Site Security"

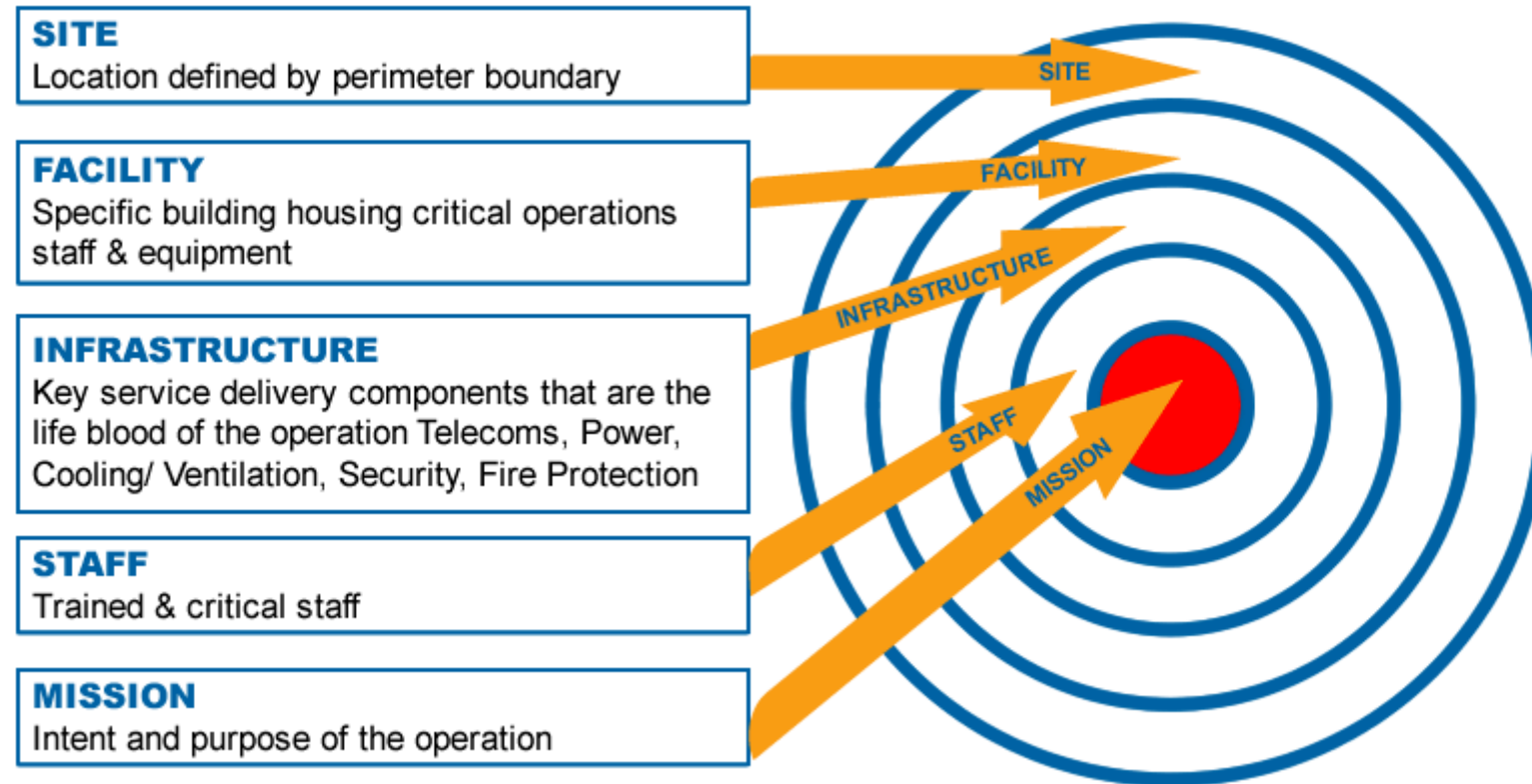## Total Site Security - integrating safety equipment

► IP based Mining Telephones / Norphonic Heavy Duty VoIP Phones

► IP based Public Address and Voice Alarm solutions

► IP based Cameras & Remote Video Monitoring

► IP based Tracking and Tagging systems

► IP based Fire Alarm systems

► IP based Access Control and Door Locking systems

► IP based Shaft Elevator Signals

► IP based Ventilation systems for Air Cooling

Total Site Security - integrating IP technology

SITE
Location defined by perimeter boundary

FACILITY
Specific building housing critical operations staff & equipment

INFRASTRUCTURE
Key service delivery components that are the life blood of the operation Telecoms, Power, Cooling/ Ventilation, Security, Fire Protection

STAFF
Trained & critical staff

MISSION
Intent and purpose of the operation

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Total Site Security - integrating safety systems

► Site Evaluation and Selection
Evaluating the mine from a safety perspective.

► Site-Specific Security Considerations
From conceptual review to final site design and budgeting.Identifying the most effective location and design for main and support entrances, emergency vehicle entrance, location of emergency equipment, telephones, cameras, signals.

► Ongoing Operations Considerations
After the site security design, construction, installation and testing is complete… <u>Make sure you get recommendations for staffing levels and security contractors, plus written policies and procedures for security operations. You also need preliminary operating budgets for annual security-related expenditures</u> (staffing, maintenance of security systems, readiness training, etc.).

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"I remember how good I was at this technology..."

vs.

"I am good at this technology"

Ongoing Training & Education

► What happens after security design, installation & testing is complete?

► What about staffing?

► Do you have written health and safety policies implemented?

► Are the policies clearly articulated and understood by staff?

► Do you have budgets set aside for technology training?

► Maintenance budget set aside for security equipment?

► Budgets for readiness and rescue training?

Remember:

Technology is no good unless people know how to operate it

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Norphonic - Summary

► Heavy Duty VoIP Telephones for underground Mining

► Reliable operation in challenging areas

► Excellent Voice Sound Quality (VSQ)

► Integrated remote monitoring and control (saves maintenance costs)

► Based on open standards (SIP, VoIP)

► Production is focused on Quality

► Adhere to relevant codes and standards

► First Class Service with 24h Local Service support

Thank you for your attention.

Learn more about our Innovations
► **www.norphonic.com**

Contact us for a Quotation
► Telephone: +47 55 62 75 20
► Fax: +47 55 59 05 16
► Email: info@norphonic.com

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Norphonic Corporate Presentation

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Fabrikkgaten 10

N-5059 Bergen

Norway

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Fax : +47 55 59 05 16
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www.norphonic.com

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