



MSHA COMMUNICATIONS AND TRACKING GUIDANCE PPL

Stakeholders Meeting





Current Requirements 2006 MINER Act

Post Accident Communications

- A redundant means of communication with the surface for persons underground, such as secondary telephone or equivalent two-way communication.

Post Accident Tracking

- Consistent with commercially available technology and with physical constraints of the mine, above ground personnel must be able to determine the current or immediately pre-accident location of all underground personnel.
- “Any system so utilized shall be functional, reliable, and calculated to remain serviceable in a post-accident setting.”



June 2009 Requirements

- For an ERP plan to be approved, it must provide for post accident communication between underground and surface personnel via a wireless two-way medium; and
- Provide for an electronic tracking system that permits surface personnel to determine the location of any persons trapped underground; or
- Set forth within the plan the reasons such provisions can not be adopted; and
- Provide alternative means of compliance that approximates, as closely as possible, the degree of functional utility and safety protection provided by the wireless two-way medium and tracking systems when these provisions can not be adopted.



MSHA MINER Act Compliance

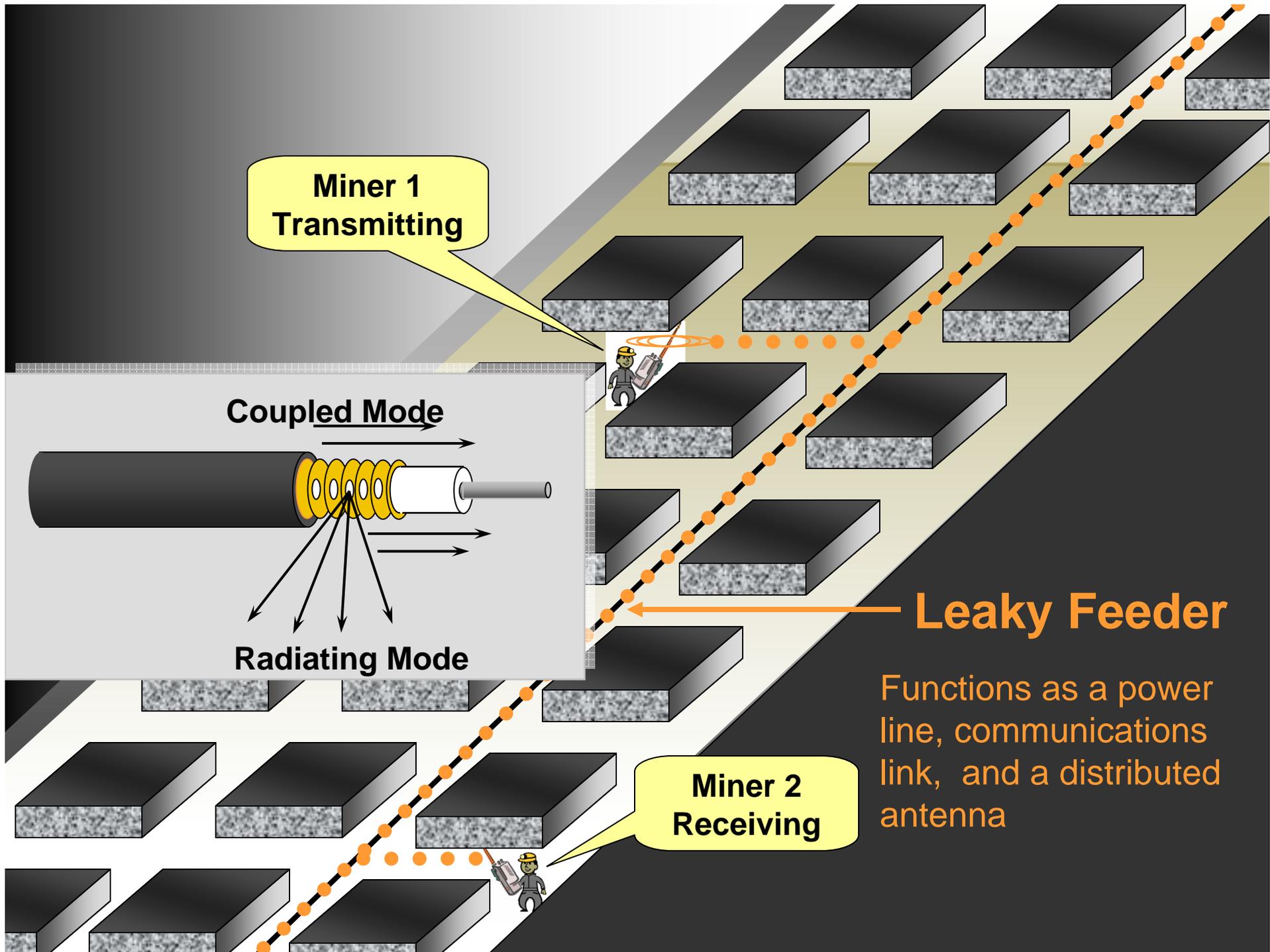
- MINER Act requires, by June 15, 2009, a plan to be approved, must provide for post-accident communications and electronic tracking systems.
- A guidance PPL was developed to assist mine operators in developing their communication and electronic tracking for their ERP.
- On December 18, 2008, MSHA made the PPL on “Guidance for Compliance with Post-Accident Two-Way Communications and Electronic Tracking Requirements for the MINER Act” publicly available on the Agency’s website for comments.
- MSHA also made available on the Agency’s website preliminary estimates of costs associated with implementing the MINER Act requirements under the guidance in the PPL.
- MSHA invited the public to comment on the guidance in the PPL, as well as the preliminary cost estimates by January 8, 2009, midnight EST.



Communications Systems

The following communication systems technologies are currently available and referenced in the PPL:

- Leaky Feeder
- Medium Frequency (MF)
- Wireless mesh
- Wi-Fi



**Miner 1
Transmitting**

Coupled Mode

Radiating Mode

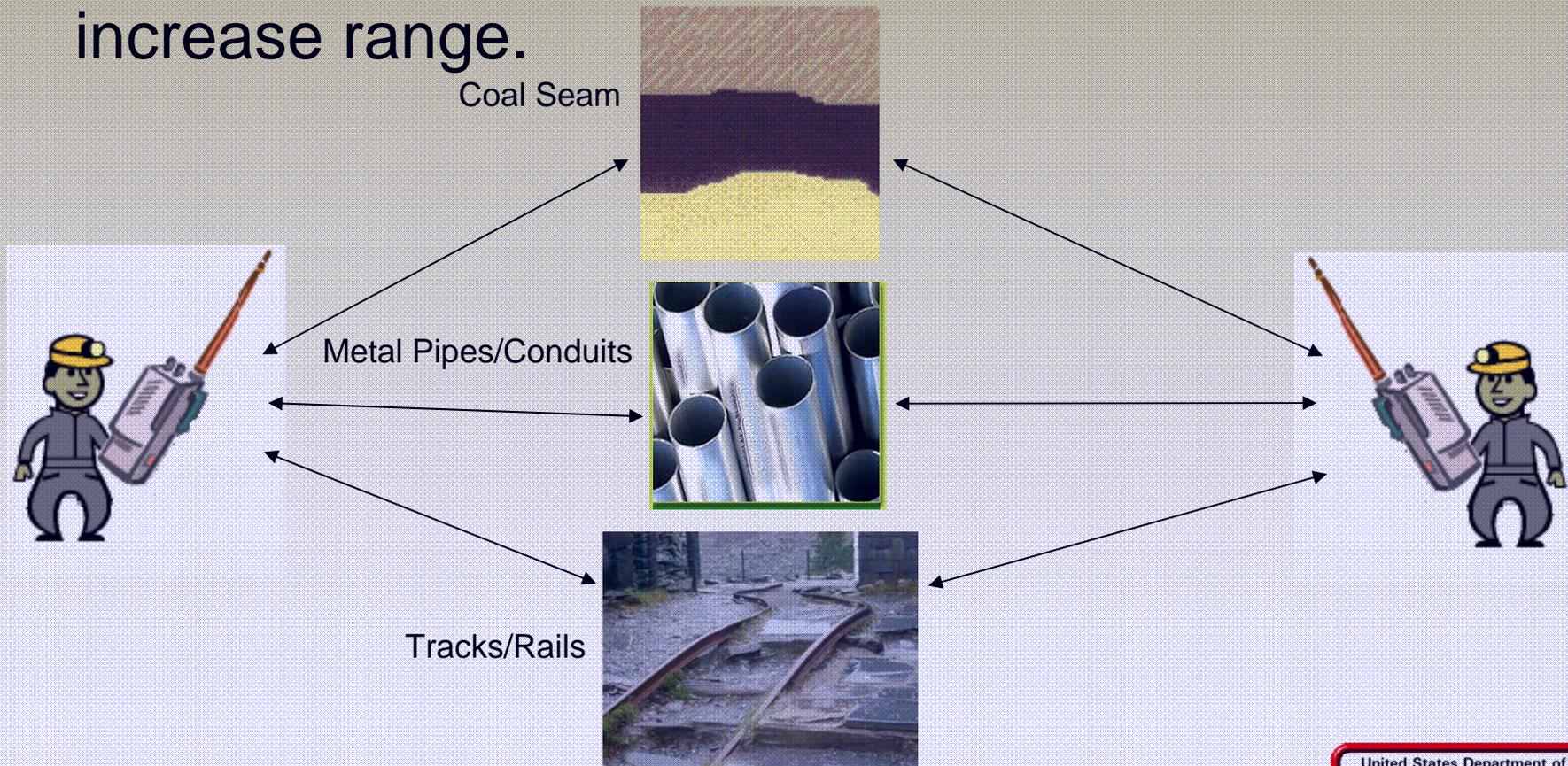
Leaky Feeder

**Miner 2
Receiving**

Functions as a power line, communications link, and a distributed antenna

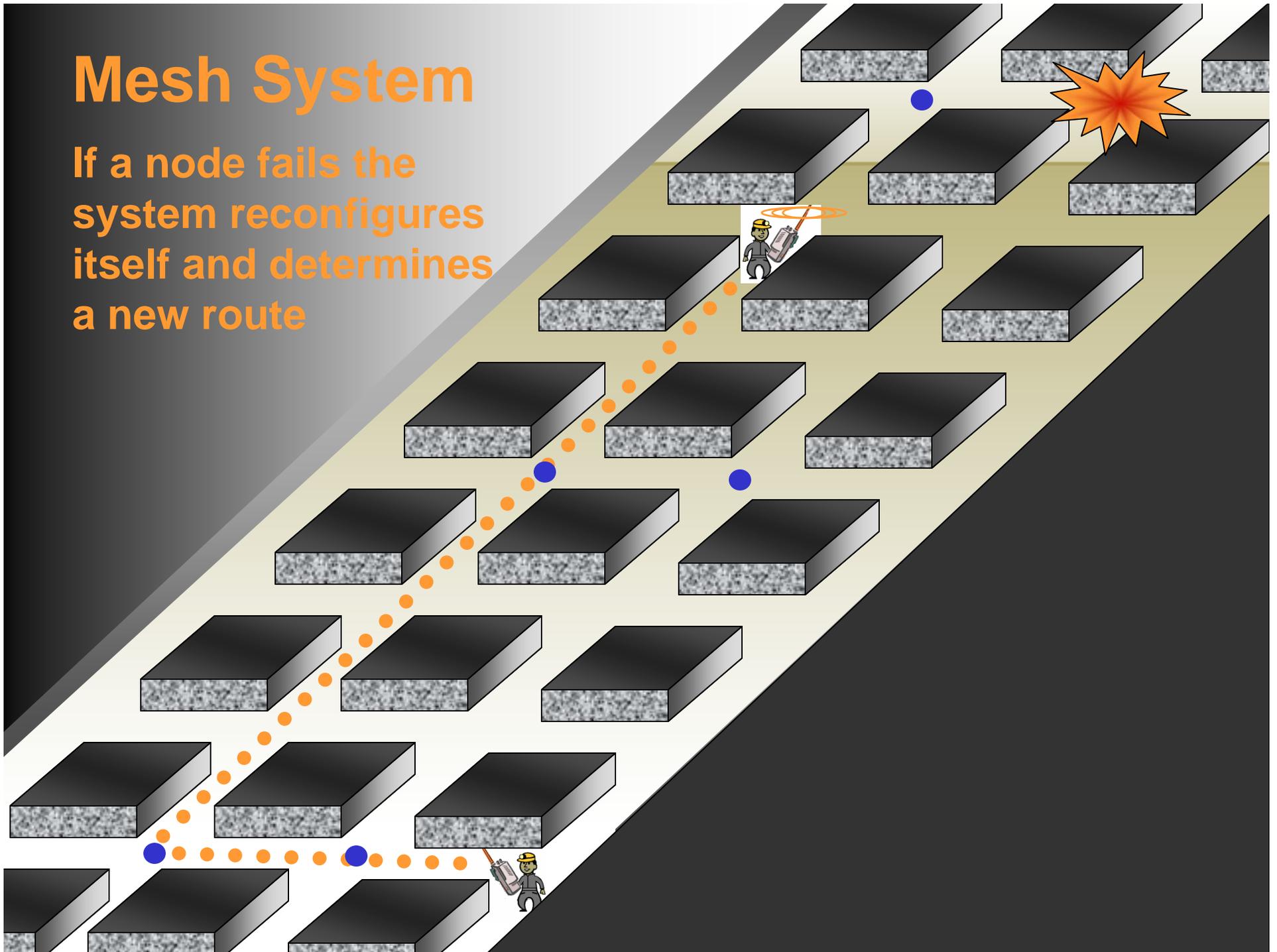
Medium Frequency (MF) Radio Communications

- Doesn't require special cable.
- Radio signal couples to other conductors to increase range.



Mesh System

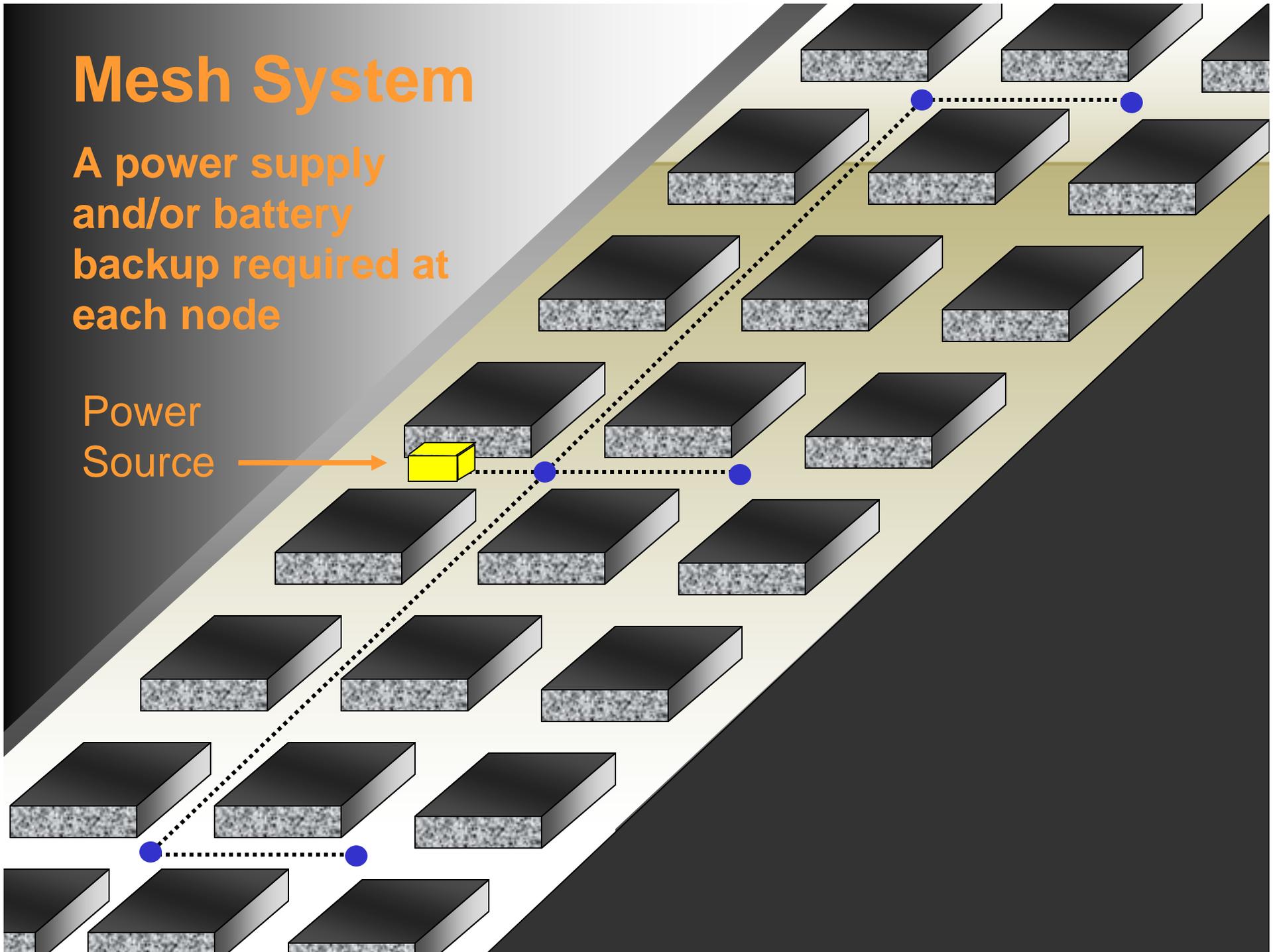
If a node fails the system reconfigures itself and determines a new route



Mesh System

A power supply and/or battery backup required at each node

Power Source





Summary of Communication System Provisions in PPL

Two-Way Communication Systems

Alternatives to wireless communication systems include, but are not limited to, leaky feeder, mesh, Wi-Fi and medium frequency systems.

1. General Considerations: Any alternative system to wireless communication generally should:

- Have an untethered device readily accessible to each miner.
- Provide communication in the form of voice and/or two-way text messages.
- Provide an audible, visual and/or vibrating alarm that is activated by an incoming signal on each untethered device .
- Be capable of sending an emergency message to each of the untethered devices.
- Be installed to prevent interference with blasting circuits and other electrical systems.



Summary of Communication Provisions

2. Coverage area

- Throughout each working section.
- Along escapeways.
- Within 200 feet of strategic areas (DM can require longer or shorter distances.)
- Strategic areas include belt drives and transfer points, power centers, loading points, SCRS caches, and other areas identified by the DM.
- Other alternatives to strategic areas identified by the DM.
- Check in/Check out procedure for bleeders or other remote location.



Summary of Communication system Provisions

3. **Permissibility**; The communication system must be approved under 30 C.F.R part 23 and applicable policies.

4. **Standby power capacity**

- 24 hours for infrastructure based on 5% transmit time, 5% send time, 90% idle time (5/5/90).
- 12 hours for untethered devices also based on 5% transmit time, 5% send time, 90% idle time (5/5/90).

5. **Surface Facilities**

- Standby power for surface portion of the communication system.
- System configured to allow communication between underground and the communication facility on the surface.
- Person at communication facility trained in system operation and ERP.



Summary of Communication Provisions in PPL

6. Survivability

Redundant signal pathways

- One system with two or more pathways, or
- Two or more systems in two or more entries.
- Protection against damage in areas vulnerable to damage.



Survivability.....The Challenge

What happens if 2,000 feet of all entries are lost?



Secondary Base Station



Overland Link

Primary Base Station



Mine Shafts





Summary of Communication System Provisions in PPL

7. Maintenance

- Manufacturer should provide maintenance schedule and checklist to mine operators.
- The mine operator should:
 - Establish and follow a procedure to ensure communications at all times.
 - Procedure to include restoring at least 24 hours of standby power for the infrastructure.
 - Examine the infrastructure on a weekly basis.
 - Assures that repairs are made immediately and the system restored to operating condition.
 - Keep a record of the examination.
 - Examine the untethered devices on a daily basis.
 - Follow the manufacturer's maintenance recommendations.



Summary of Electronic Tracking System Provisions in PPL

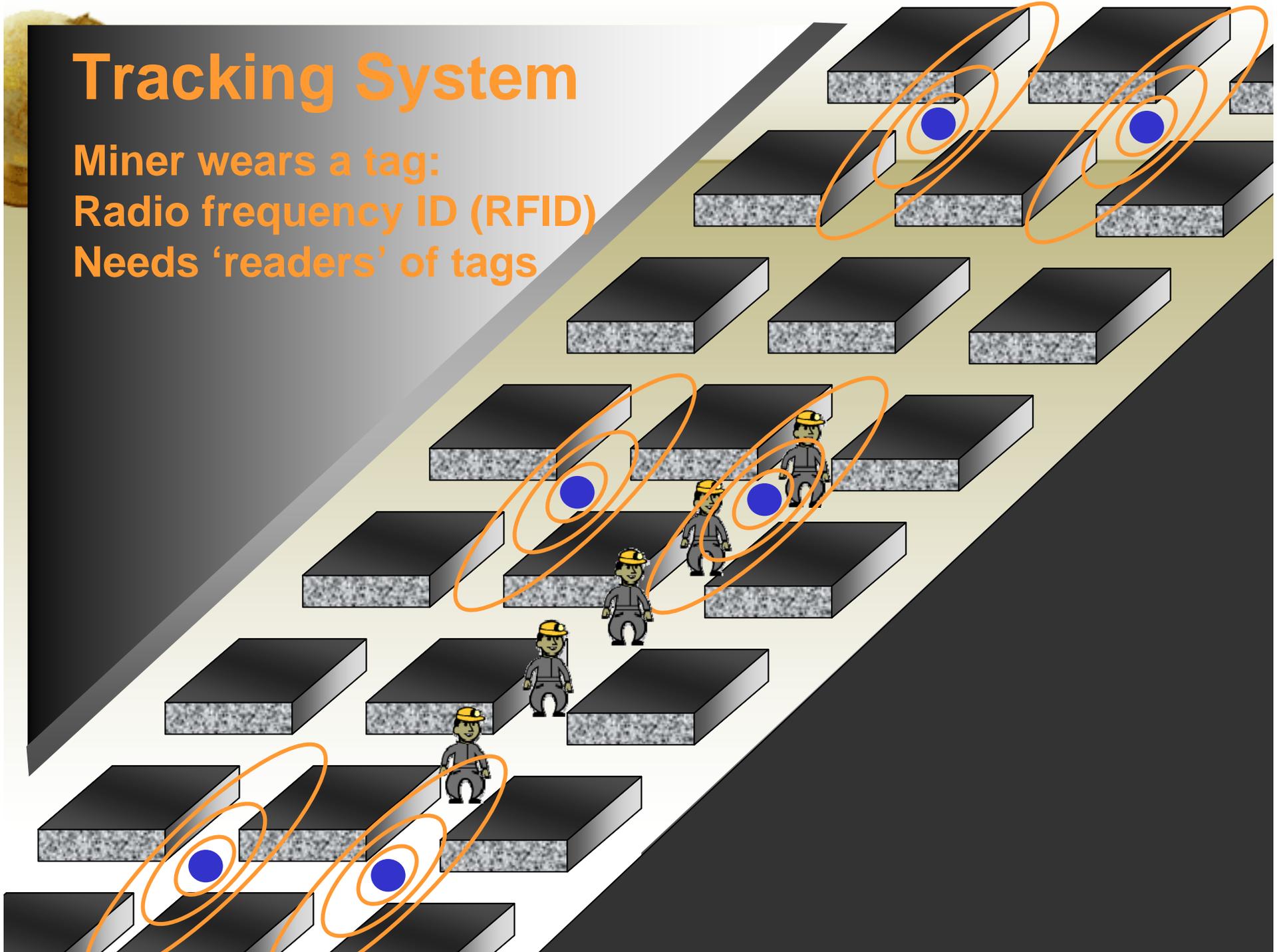
Electronic Tracking System

1. Performance

- Determine the location of miners on working section within 200 feet.
- Determine the location of miners in escapeways at intervals not to exceed 2000 feet.
- Determine the location of miners within 200 feet of strategic areas such as belt drives, transfer points, power centers, loading points, SCRS caches and other areas identified by DM.
- Determine direction of travel at key junctions in escapeways.
- Determine the identity of miners within 200 feet of refuge alternatives.
- Installed to prevent interference with blasting circuits and other electrical systems.

Tracking System

Miner wears a tag:
Radio frequency ID (RFID)
Needs 'readers' of tags





Summary of Electronic Tracking Systems Provisions

2. Permissibility

The tracking system must be approved by MSHA under 30 C.F.R. part 23 and applicable policies.

3. Standby power

- 24 hours of continuous tracking for infrastructure after a power loss.
- 12 hours for devices worn by miners (tags).

4. Capacity

system must be capable of tracking the maximum number of persons expected to be in a coverage area.

5. Scanning rate

system should be capable of updating location data every 60 seconds.





Continued Summary of Tracking System Provisions in PPL

6. Surface Consideration

- Standby power for surface portion of the system.
- System configured to allow monitoring location of miners from communication facility.
- Person on duty trained.
- Display the last known location of a miner when the tracking device is not communicating with the system.
- Uniquely identify each miner.
- Location data associated with a time stamp.
- Location data stored for two weeks.



Summary of Tracking System Provisions in PPL

7. Survivability

- Components installed in areas vulnerable to damage protected (recessed areas, around corners..).
- Data storage not impacted by interruption of data link between surface and underground.

8. Maintenance

- Manufacturer provide maintenance schedule and checklist to mine operators.
- The mine operator should:
 - Establish and follow a procedure for tracking during system or component failure.
 - Procedure to include restoring at least 24 hours of standby power for the infrastructure.
 - Examine the infrastructure on a weekly basis for proper operating condition.
 - Assures that repairs are made immediately.
 - Keep a record of the examination
 - Examine devices worn by miners on a daily basis for proper operating condition.
 - Follow the manufacturer's maintenance recommendations.



Questions?

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MSHA COMMUNICATION AND TRACKING APPROVALS





CURRENT MSHA APPROVED TECHNOLOGIES

- Page and trolley phones
- Leaky feeder systems
- Portable Hand-held Radios
- One way text messaging system (PED)
- RFID Tracking
- Wireless Mesh Communications and Tracking Systems



APPLICATIONS UNDER EVALUATION

35 applications currently under investigation include:

- 13 RFID
- 4 Leaky Feeder
- 5 Peripherals (Portable Radios/VOIP phones/PDAs/text messaging devices)
- 6 Mesh Systems
- 1 medium frequency system
- 6 Misc. (page phones, longwall face phones)



RECENT APPROVAL ISSUANCES

- 12 Approvals in 2006 including
 - Kenwood portable radio
 - Several tracking tags

- 23 in 2007 including
 - Tracking tags
 - Tunnel Radio Leaky feeder system

- 33 in 2008 including
 - Becker enhanced leaky feeder
 - Venture Design wireless tracking and text messaging system
 - Motorola Portable Radio
 - Subterracom (SWS) tracking and text messaging device
 - Matrix Design Group RFID tracking system
 - NLTech IEEE 802.11 node over fiber
 - IWT and L3 wireless mesh



Questions?

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