

Astra
Wireless

Wireless solution for mining industry

ASTRA DRIVE



Astra Drive: Embrace Challenges

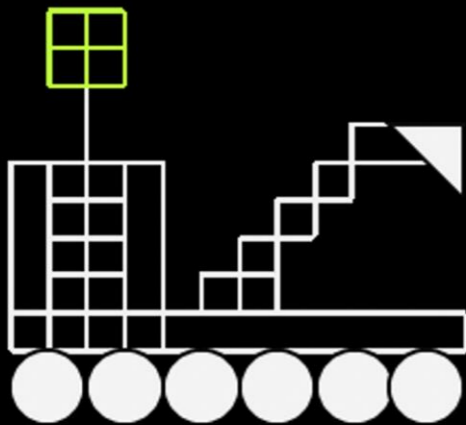
- New services for vehicles emerge and require fast and reliable connectivity
- Simple fixed wireless applications are overcrowded with competition
- The complexity of mobile projects is exactly what gives us an edge



Main applications for Astra Drive:

01 ■

Wireless for Mining



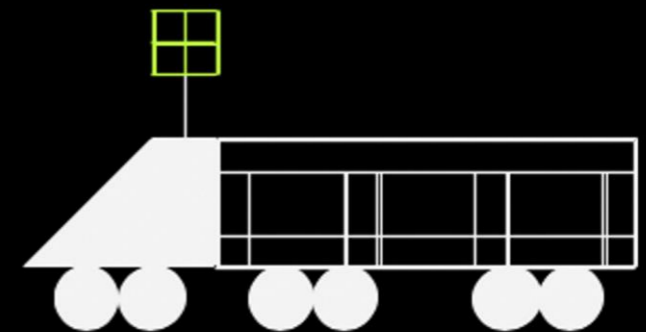
02 ■

Ship-to-Shore



03 ■

Train-to-Ground





- Companies in the energy and mining sector sometimes operate in the most challenging environments across the world

To keep up with the latest advances, they are using new methods such as remote-controlled trucks and telemetry for vehicle monitoring. For these operations, it is crucial to have a dependable and effective infrastructure that can connect the entire fleet, ensuring the smooth functioning and prosperity of the business.

Challenges



- Changing landscape

- Heavy vibrations



Alternative Solutions for Mining Industry

Wi-Fi Mesh

- + Every node has several connections to ensure reliability
- It is hard to design the network with the customer SLA in mind
- Mutual interferences and hardness of radio planning

Private LTE

- + Providing a stable coverage at a limited area seems logical with Private LTE
- Capital expenditures per subscriber are huge when their number is not big
- Provide only 5 Mbps per mobile unit



Case Summary

Shubarkol Komir

- Total Area

70 km²

- Number of Sectors

70+

- Number of Vehicles

100+

- Shubarkol Komir JSC is one of Kazakhstan's largest coal producers.

Wireless network is organized on the territory of 2 open pit coal mines: Centralny and Zapadny.



Our solutions help provide Internet access, corporate networks, telephone communications, CCTV signal transmissions, interconnections of remote company facilities and communications with different types of mobile machinery with data transmission rates



Astra DRIVE System

- Astra DRIVE is a complex solution there all units are joined to a single ecosystem to fulfill the requirements of a communication with mobile objects.



Tailored wireless terminals

Wireless devices were modified specially for the mobile scenarios to ensure appropriate power options and quick seamless roaming.

Network controller

Astra Wireless proprietary MUX L2-controller available in hardware and virtual version ensure the traffic balancing and seamless roaming during objects movement.

Monitoring system

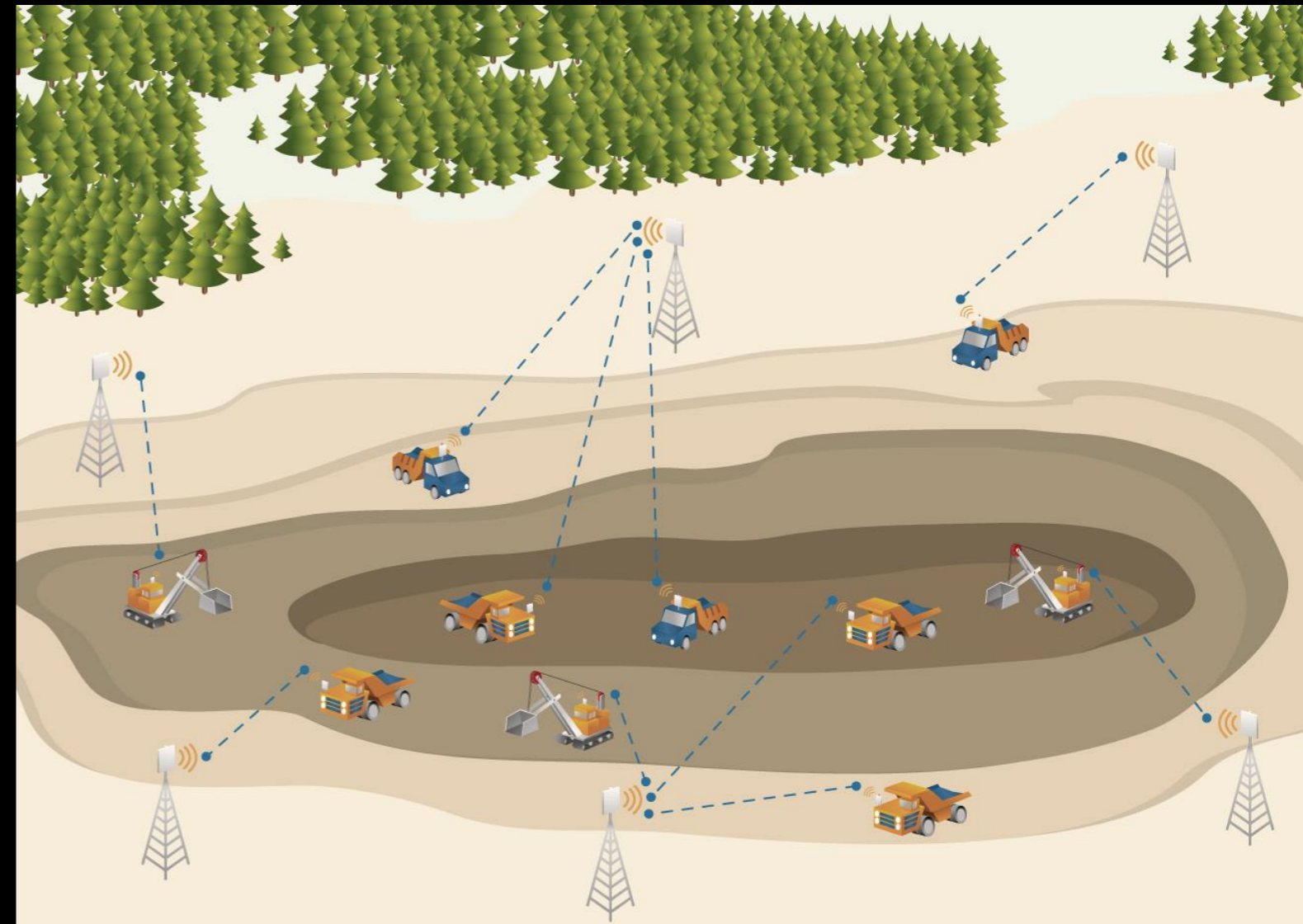
The system provides a wide range of options for monitoring and management, which allows to solve any problems appeared on the wireless network in a shortest time.



Connectivity Scheme

The entire system consistently monitors wireless connection parameters and trends. As the vehicle is in motion, the connection between the base station and the vehicle terminal begins to weaken. The terminal detects this decline in connection quality and initiates a process to switch to a better connection.

- Certain locations should be selected for base stations to make it cover the whole area
- Each vehicle can be equipped with either:
 - 1-2 wireless subscribers with omni antenna
 - 4-6 wireless subscribers with directed antenna





MINT protocol

MINT - Mesh Interconnection Network Technology is proprietary Astra Wireless network protocol which offers an alternative routing method, by taking into account the network topology changes and evaluating the quality of the radio links in real time.

- **Improved mobility**

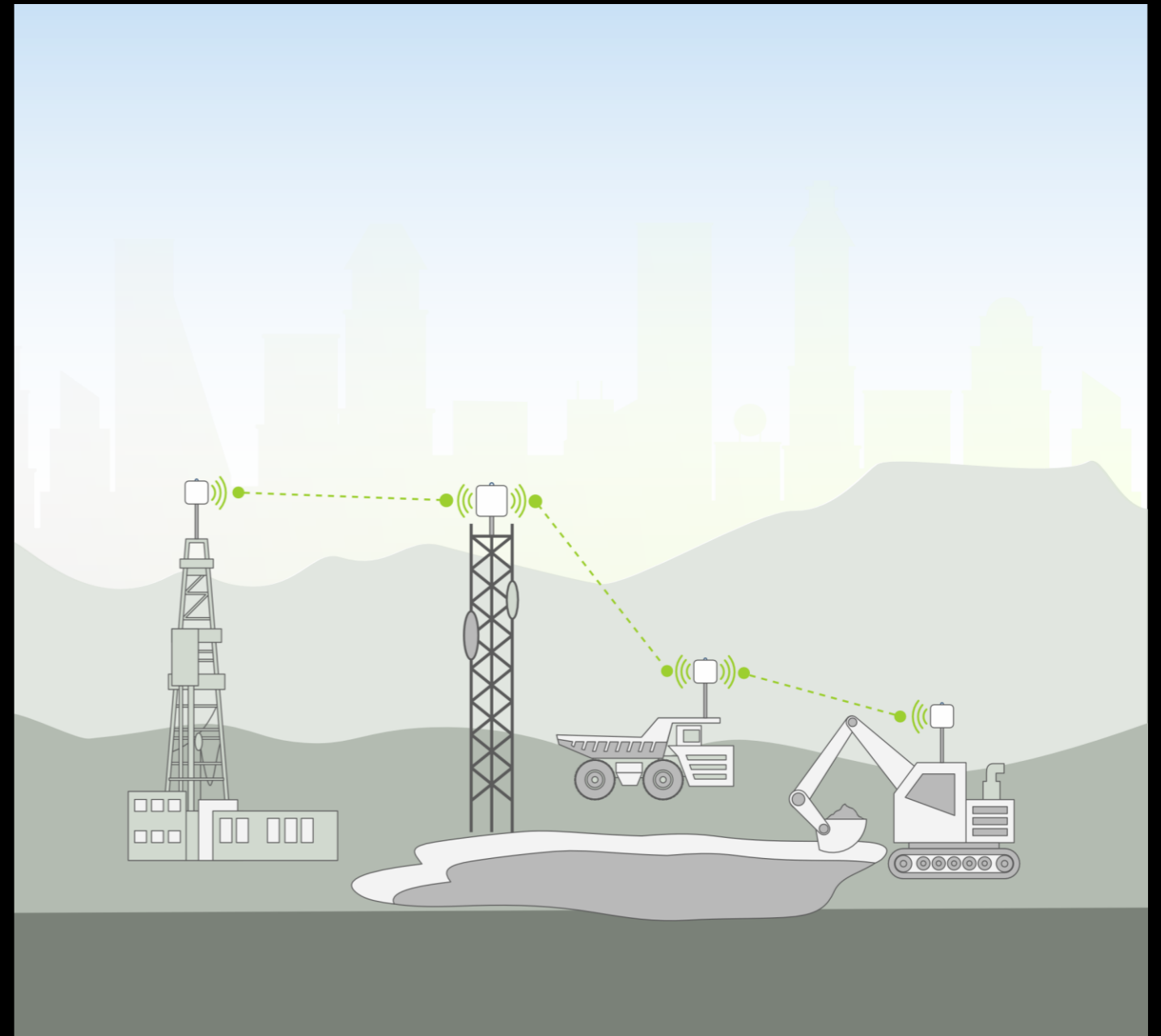
Thanks to a flexible network design based on the each to each principle, transit traffic can be transmitted through mobile nodes, which reduces the amount of fixed infrastructure

- **Tolerance to landscape changes**

MINT protocol works in real time, selecting the fastest route to transmit data. If a route become unavailable or blocked, MINT will dynamically reroute data through the nearest suitable available device

- **Easy scalability**

All devices in the MINT infrastructure are compatible with each other, thus new nodes can be added to the network without changing the settings of the operating nodes





Key parameters

- Bidirectional throughput

760 Mbps

Aggregated throughput
at QAM64 $\frac{3}{4}$ in 80 MHz

- Average latency

150 ms

Maximum jitter value
no more than 30 ms

- Maximum moving speed

250 kph





System components

- Wide range of wireless stations for any scenario

Frequency range:
4900 – 6425 MHz



- Network controller

With the use of our exclusive MINT protocol, the controller actively assesses the wireless link parameters and guides traffic through operational base stations.





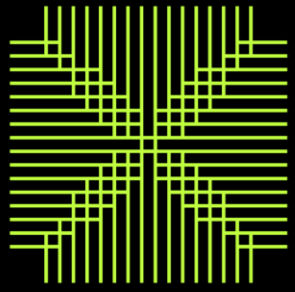
Network monitoring

Astra DRIVE NEXT, an advanced wireless network monitoring system that empowers you with comprehensive tools for centralized management and monitoring of Astra Wireless devices. Seamlessly manage network configurations and firmware updates to optimize operations, enhance reliability, and simplify maintenance.

Key Features

- Automatic devices operation changes monitoring and the incidents formation in accordance with configured rules
- Wireless devices configuration management with version control
- Device firmware management
- Automatic hosts and links detection
- Topological and geographical network maps





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