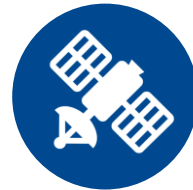


Bridging the Connectivity Gap: Starlink and LTE



Mark Lewis, Daniel Breakell

Titan ICT



Titan ICT

Company Overview

Titan ICT is an independent, Australian-owned engineering company specialising in:

- ▶ Strategic ICT Advice.
- ▶ Engineering and Design.
- ▶ Systems Integration.
- ▶ Support and Managed Services.

Industry Specialisations Include:

- ▶ Mining.
- ▶ Energy.
- ▶ Utilities.

Expertise:

- ▶ Private LTE Technologies (4G/5G).
- ▶ 5G-as-a-Service.
- ▶ **Enterprise** Microwave.
- ▶ Mission Critical Push to Talk.
- ▶ Industrial Wi-Fi.
- ▶ Industrial Networks.
- ▶ Digital Mobile Radio.
- ▶ Critical Communications Networks.
- ▶ LoRaWAN.
- ▶ Industrial IoT.
- ▶ WDM Optical Networks.
- ▶ Village Entertainment Solutions.
- ▶ CCTV.
- ▶ Drone Inspections / Tower Management.



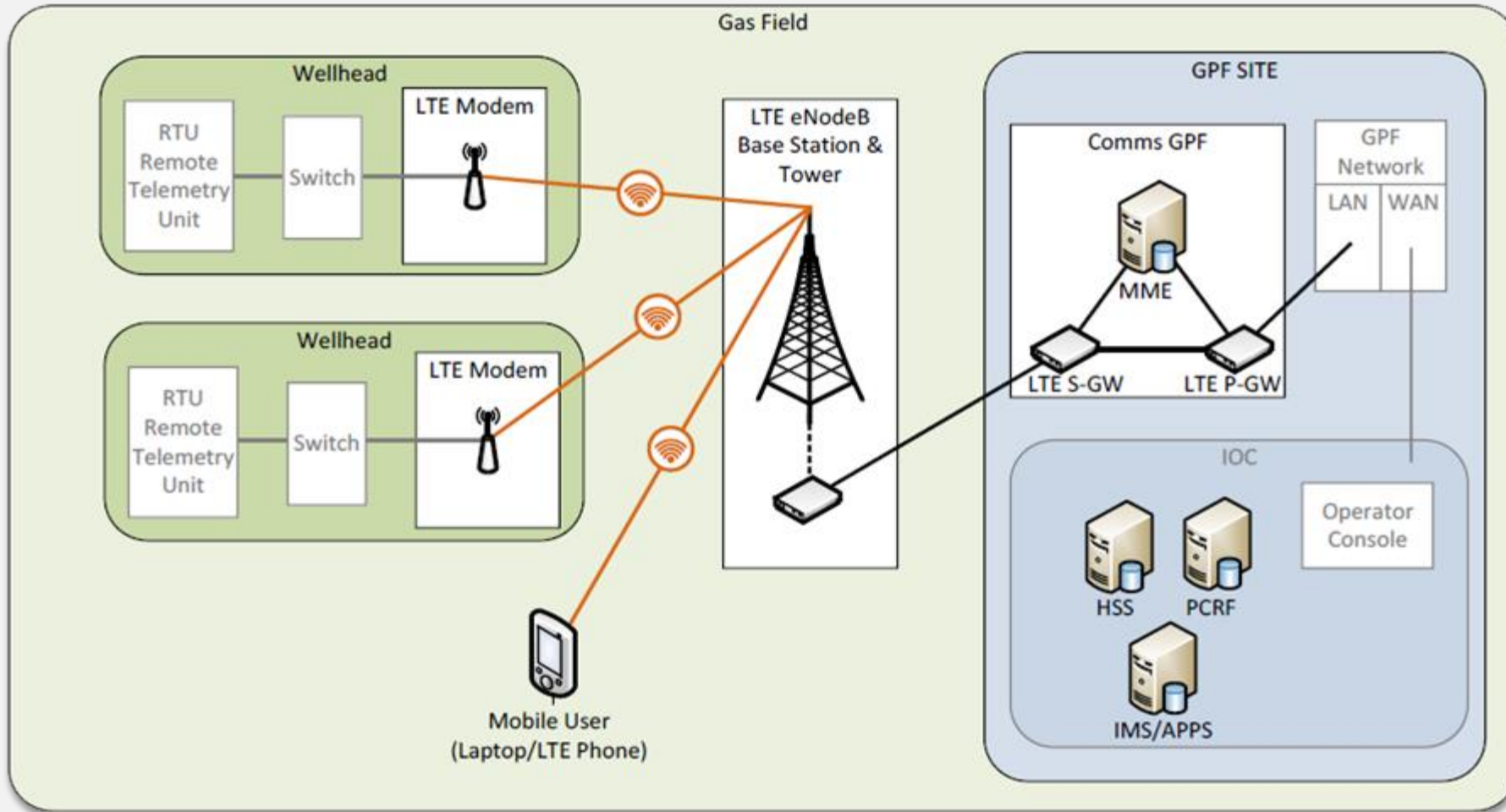
What role can Starlink play in enhancing network capabilities within heavy industry, where traditional backhaul and LTE solutions are commonly used?



What connectivity challenges can Starlink help address?

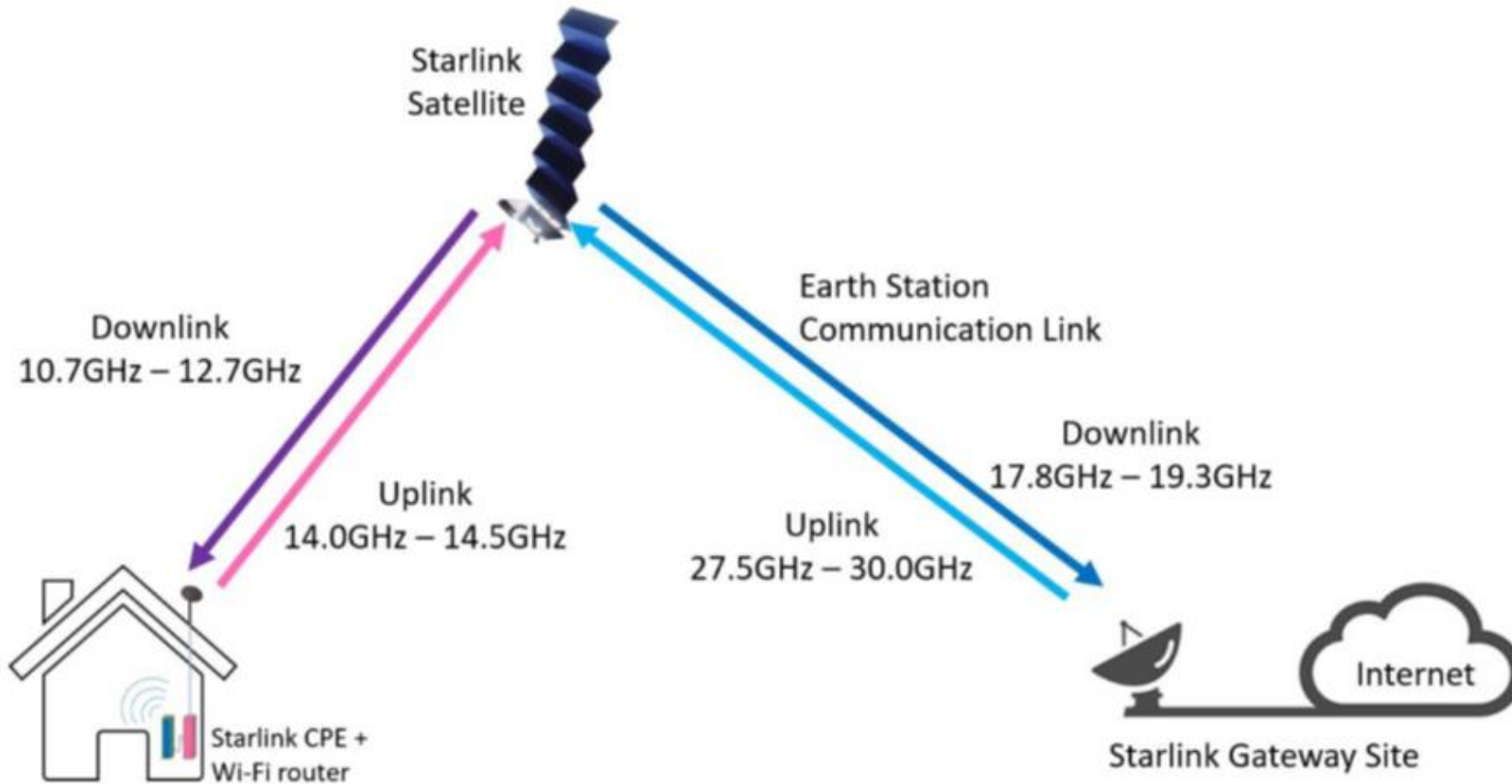


What key considerations should network stakeholders make when considering Starlink connectivity solutions?



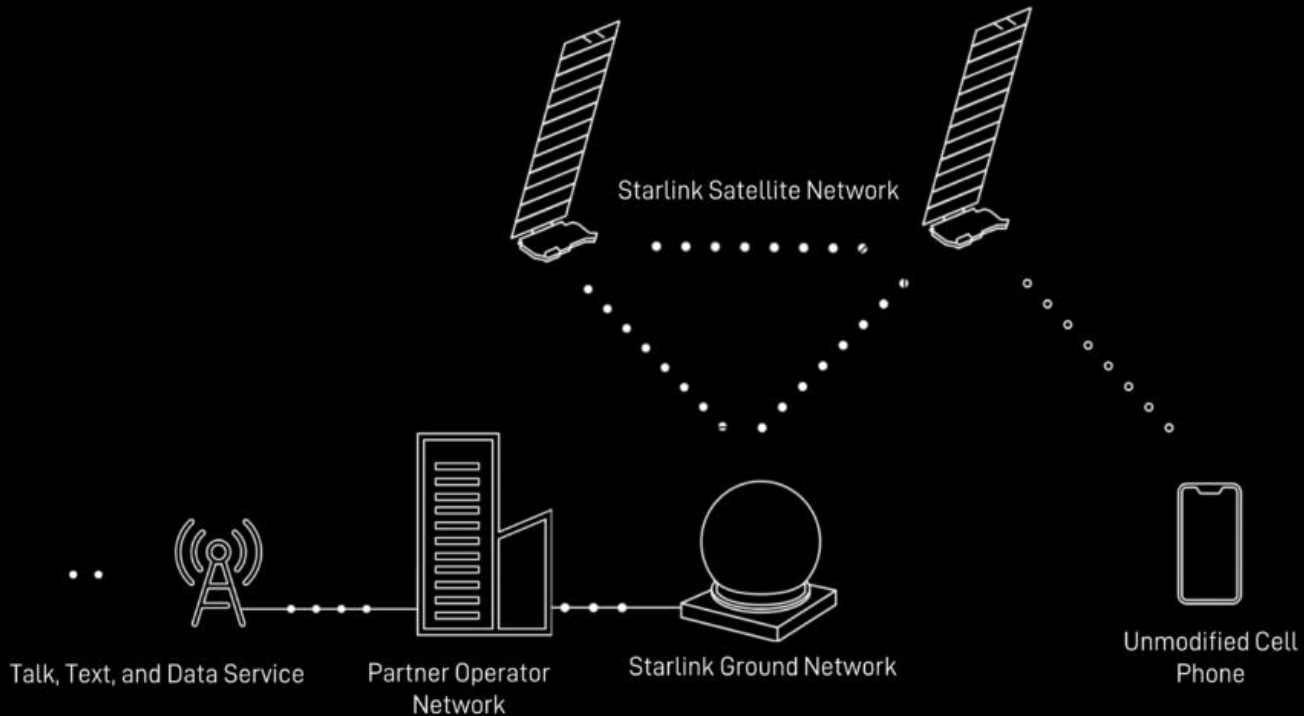
- ▶ eNodeB
- ▶ EPC
- ▶ UE

- ▶ Frequency Bands
- ▶ MIMO
- ▶ Carrier Aggregation



- ▶ LEO Satellites
- ▶ Ground Stations
- ▶ User Terminals

- ▶ Phased Array Antennas
- ▶ Inter-Satellite Links



Direct to Cell and IoT

- ▶ Beyond asset tracking
- ▶ 4G-enabled devices
- ▶ IoT to become available in 2025

(Credit: SpaceX's Starlink)

Oil & Gas



Mining



Image: signal-fire.com

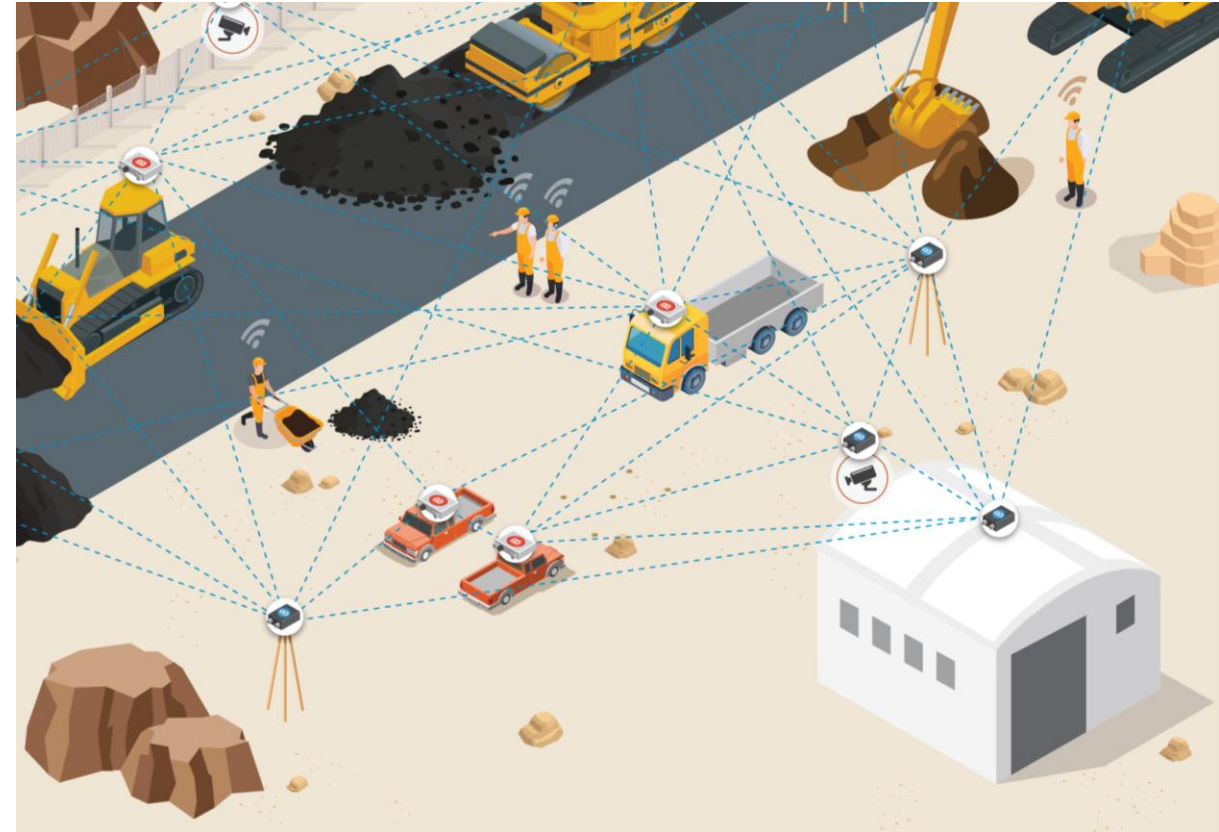


Image: Rajant

How LTE has Driven Smart Mining



SAFER OPERATION

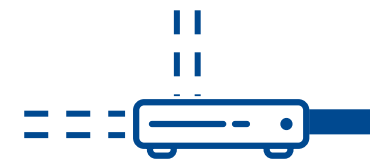
EFFICIENT PRODUCTION

PREDICTIVE MAINTENANCE

Critical Communications in Mining

- ▶ Reliance on LTE
- ▶ Expectations of High Availability
- ▶ Increased Redundancy

Requirements



**Bonded
Backhaul**



**In-Vehicle
Connectivity**

Scalability and Availability

FEATURE	LTE	STARLINK
NETWORK EXPANSION	●	●
UPTIME	●	●
LOCAL COVERAGE AREA	●	●

BACKHAUL



Ideal for remote or isolated regions



Reduces the need for extensive terrestrial infrastructure



Can be bonded



Traditional network security techniques apply

ACCESS



Requires Starlink terminals at each access location



Extend connectivity past network edge without extending the primary network



Zero Trust Architecture



Robust Endpoint Security



Centralised Network Management (SD-Wan and VPNs)



Primary Network

Key risk considerations in this scenario may include, diversifying across multiple satellite network providers in a bonded solution, as well as higher than standard, temporary network outage tolerance.



Redundant Network

Key risk considerations in this scenario may include, ensuring the reliability of the failover switching mechanism, and network usage prioritisation planning.

Key Considerations: Data Management

To maximise the potential of Satellite connectivity, network stakeholders should consider the following strategies



**Prioritise
Data**



**Optimise Bandwidth
Usage**



**Implement Edge
Computing**

Opportunities



**Remote
Areas**



**Backhaul at the
Point of Access**



**Bonded Starlink
Solutions**



**Network
failover and
Redundancy**



**Employee
Connectivity
and Welfare**

Considerations



**Cost-Benefit and
Scalability**



**Operational
Needs and
Latency**

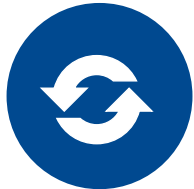


**Security
Considerations**

Final Considerations



Do you require a Network / Feasibility Study?



Network Failover – Will your solution be bonded with a terrestrial backhaul or other satellite connectivity providers, or will other failover mechanisms be deployed?



If Starlink is to be a primary network solution, how will redundancy be achieved?



How will you secure your data and network traffic, especially if using multiple distributed Starlink backhaul locations?