

Galdeus UK Optical Strategy & Technical Communications

FSO & LiDAR: Overview

Free-Space Optics (FSO) and LiDAR are two optical technologies that both use light, but they address **entirely different organisational needs**.

1. Free-Space Optics (FSO)

High-speed connectivity without civil works

FSO transmits data through the air using a narrow, precisely aligned laser beam. It offers fibre-like bandwidth where physical installation is blocked, delayed, or cost-prohibitive.

Applications

- Linking buildings across roads, rivers, rail lines, or heritage sites
- Rapid deployment where fibre is not feasible
- Temporary connectivity for construction, events, or emergency response
- 5G small-cell backhaul and campus extensions

Benefits & considerations

- Fast deployment (hours, not weeks). No trenching or wayleave requirements
- High bandwidth (1–10+ Gbps)
- Secure, narrow optical beam. Requires clear line-of-sight
- Weather, especially fog, can reduce performance
- Not a full substitute for fibre in mission-critical environments

FSO is a **strategic enabler** that unlocks connectivity when fibre is not an option. It is ideal as a bridging or augmentation technology.

2. LiDAR (Light Detection and Ranging)

3D spatial intelligence for automation and sensing

LiDAR emits rapid laser pulses and measures reflections to build detailed 3D maps. It is a **sensing** technology, not a communications system.

Applications

- Autonomous vehicles and robotics
- Industrial automation and smart-infrastructure
- Security and perimeter monitoring
- Surveying, mapping, and environmental modelling
- Drone-based inspection and asset management

Benefits & considerations

- High-accuracy 3D perception
- Reliable in low-light or complex environments
- Enables automation, navigation, and real-time decision-making
- Higher cost than camera-based systems
- Requires processing capability for point-cloud data
- Not suitable for data transport

-

LiDAR provides **machine-level awareness**. It complements connectivity solutions but does not overlap with them.

3. FSO vs LiDAR — At a Glance

	FSO	LiDAR
Primary Function	High-speed wireless data link	3D sensing and mapping
Solves	Connectivity challenges	Automation and perception challenges
Best For	Sites where fibre is blocked or delayed	Robotics, vehicles, surveying, security
Key Value	Bandwidth without digging	Real-time spatial intelligence
Technology Type	Communications	Sensing

4. Strategic Recommendations

- Use **FSO** when immediate bandwidth is required or fibre installation is constrained.
- Use **LiDAR** when pursuing automation, robotics, digital twins, or advanced security.
- Treat the two technologies as **complementary**: one delivers connectivity, the other delivers environmental awareness.
- Position FSO as a **tactical accelerator** and LiDAR as a **strategic enabler** for smart-infrastructure programmes.

Conclusions

FSO and LiDAR are powerful but fundamentally different optical technologies. Understanding their roles helps organisations reduce risk, avoid misalignment, and invest with confidence. Galdeus UK provides clear, vendor-neutral guidance to ensure each technology is deployed where it delivers maximum operational and strategic value.