

## FREE SPACE OPTICAL COMMUNICATION FOR TACTICAL OPERATIONS

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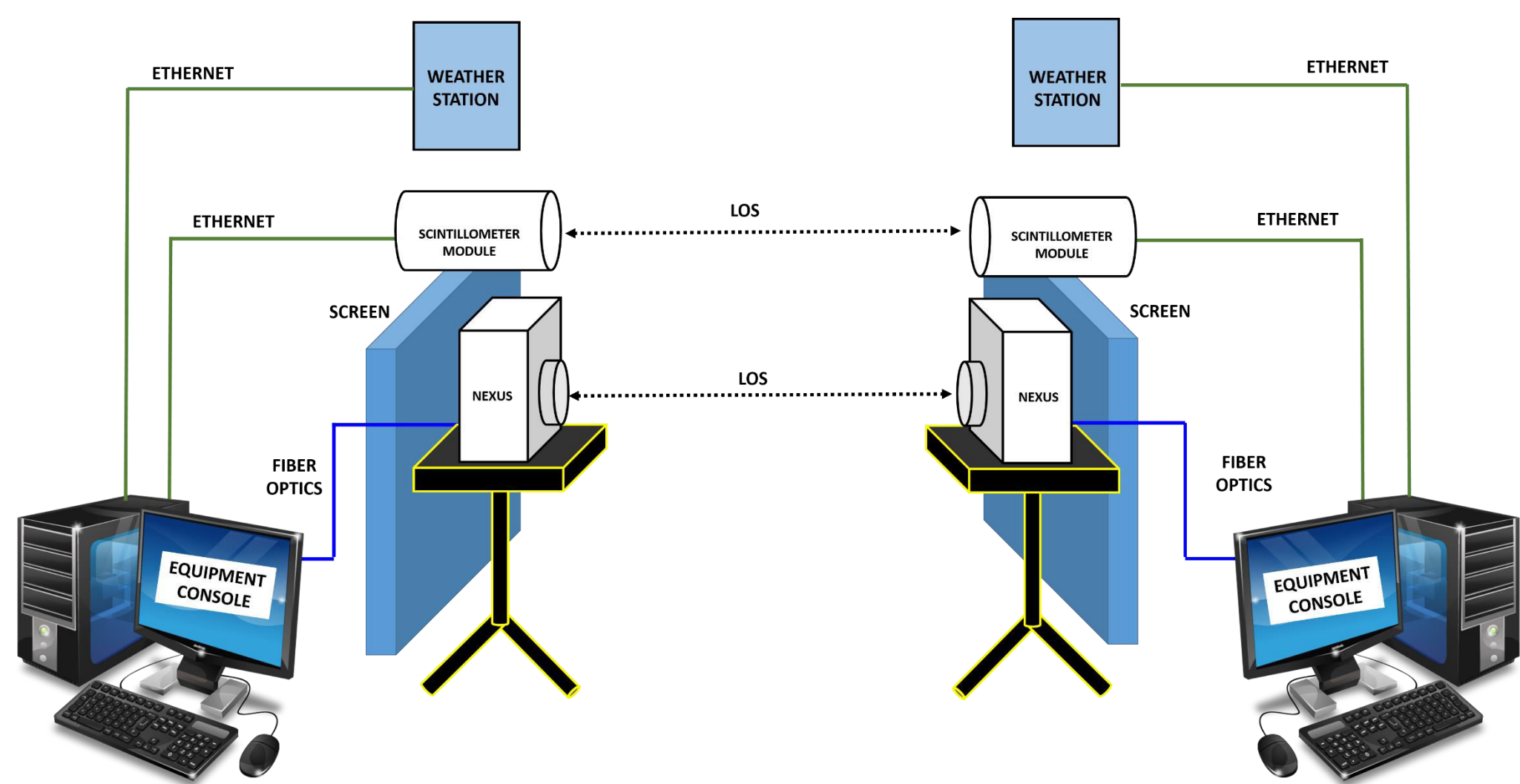
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### OBJECTIVES

- Understand Free Space Optics (FSO) and explore its advantages and limitations.
- Design field experiment tests for evaluation of a given FSO communications system.
- Conduct the designed experiment and analyse the collected results.



NEXUS 3 FSO communications system, 9.40km link, Camp Roberts



Final Setup for Experiments

### EXPERIMENTATION

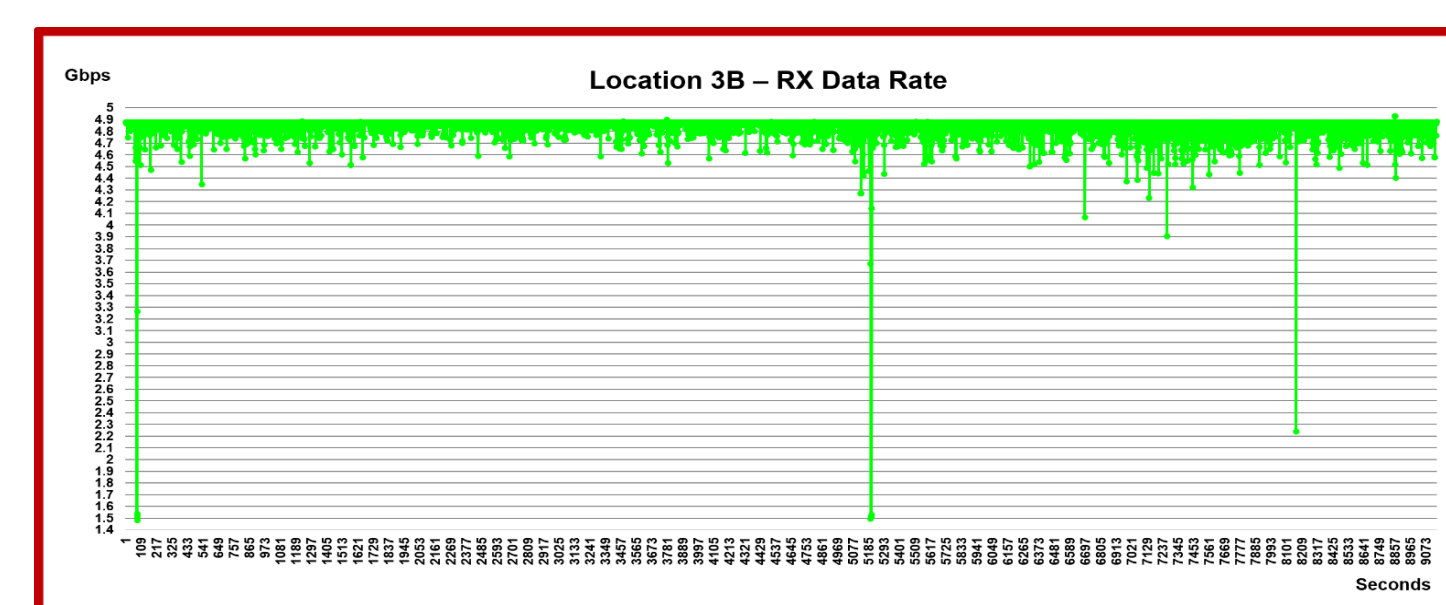
- NEXUS 3 FSO communications system, a class 1M laser system, was cleared by the Department of Navy LSRB to be safe for experimentation.
- A experimentation plan was designed and a set of controls implemented for laser-related experimentations.
- Experiments were conducted for 3.06km, 7.47km and 9.40km during JIFX held in Camp Roberts, California.

### CONCLUSION

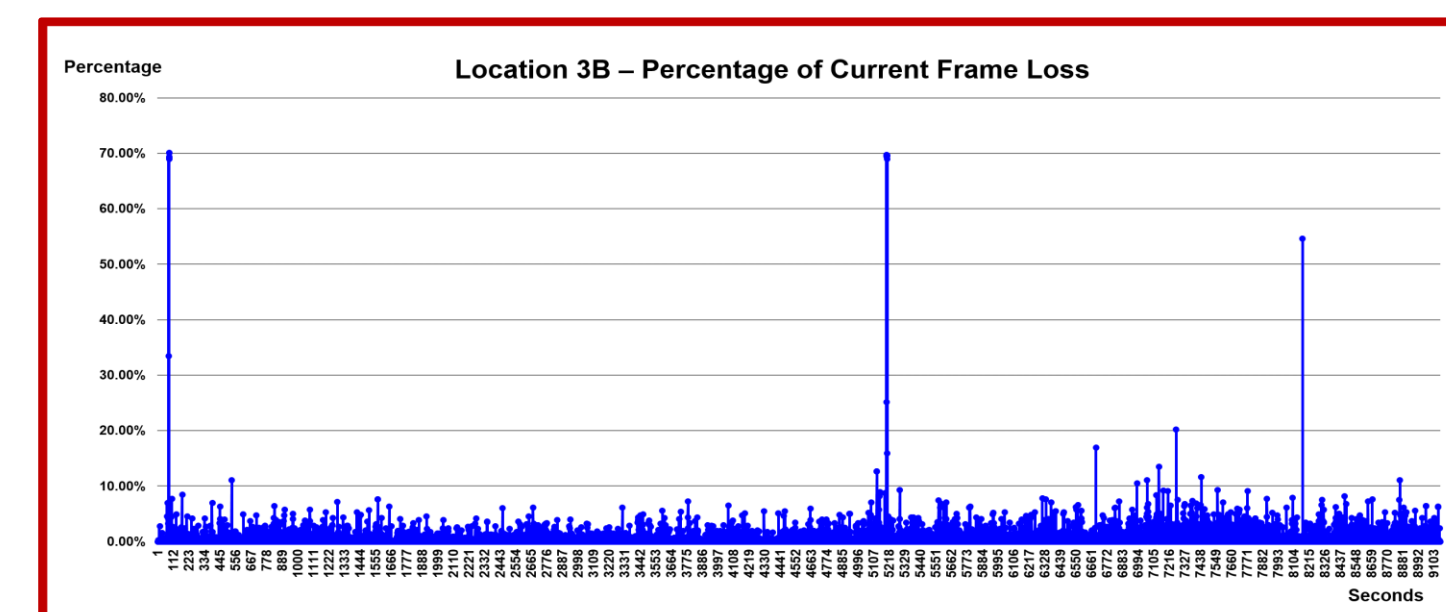
- Strengths of FSO: High bandwidth, Immunity to EMI, High level of security.
- Challenges of FSO: Strictly LOS, Greatly affected by atmospheric effects, Poses safety concern following use of laser.
- NEXUS FSO communications system is capable of sending and receiving 4.7 Gbps of Ethernet load using a 10 Gbps data stream over a link range of 9.40 km with a mean percentage frame loss of 0.23%.
- FSO is a viable means for military communications for tactical operations.

### POTENTIAL FUTURE WORK

- More experiments with NEXUS FSO communications system for better characterization..
- Experiments with other FSO systems to provide alternatives.
- Implementing relay capabilities as a solution to overcome the FSO challenge of being a strictly LOS communications system.



Received Data Rate



Percentage Frame Loss

Reference