

Low Loss Passive Optical Networks for Avionics



Overview

This paper introduces one kind IMA architecture based on passive optical network. The LOADNET project focuses on the realisation of cost-effective European photonic network technology for next generation, aircraft data communication systems and the exploitation of the huge investment made by the commercial telecomms and datacomms sectors in fibre-optic technology. Issues such as burst-mode detection in upstream PON scenarios, flexible rate allocation in downstream scenarios, and the simplification of hardware complexity at the optical network unit (ONU) side have. FTTH passive optical networks (PON) began with GPON, which for several years was used for lower bit rates (one gigabit and slower), then gradually evolved into a low-cost, well-proven technology, more recently resulting in XG-PON1 and XG-PON2 (allowing higher speeds). At present, high-blocking, large delay, and high insertion loss is the bottleneck of large-scale processor. This project is part of a study within the Advanced Air Transportation Technologies program undertaken at the NASA Glenn Research Center. Current and future advances in.



Article Content

Jan 13, 2026

Passive optical local area network (LAN) | White paper | EXFO

Passive optical LAN is a GPON-based technology that creates a very cost-effective LAN with virtually unlimited capabilities. Following the FTTH trend to deliver more bandwidth to consumers, this new

Nov 05, 2025

Passive Optical Networks: An intro to xPON

Conclusion Passive Optical Networks represent a significant advancement in telecommunications technology, offering high-speed, reliable,

Aug 20, 2025

Low Cost Optical Avionics Data Networks (LOADNet)

The LOADNet project focuses on the realisation of cost-effective European photonic network technology for next generation aircraft data communication systems, and the exploitation of

Jan 31, 2026

Optical communication systems for avionics | IEEE ...

In this paper, we survey the field of low-power communication systems from the avionics engineering perspective. We review the fundamental merits of optical fiber for information transmission and

Sep 17, 2025

Connecting The Future of Flight | TE Connectivity

Even with the inherent advantages of fiber optics, optimum system performance depends on properly integrating appropriate active and passive technologies. As a vertically integrated company, TE

Sep 27, 2025

112.5 Gbit/s long reach passive optical network with over 31 ...

Optically amplified RNs were proposed for 10G PONs to overcome the transmission and passive losses in the network 28, 29, 30.

May 04, 2026

Key Technologies for a Beyond-100G Next-Generation

The explosive development of emerging telecommunication services has stimulated a huge growth in bandwidth demand as people seek universal

Aug 15, 2025

Multi-user low-upstream-loss multi-mode passive optical network with ...

Abstract Multi-user, low-loss, and cost-efficient characteristics are highly desired for widely deployed passive optical networks (PON), which are constrained by the upstream power

Nov 05, 2025

THE COMSOC GUIDE TO PASSIVE OPTICAL NETWORKS

This handbook is a convenient reference guide to the rapidly developing family of passive optical network (PON) systems, techniques, and devices. Our objective is to provide a quick, intuitive

Dec 06, 2025

Fiber-optic communication links suitable for on-board use in modern ...

The conventional solutions for digital optical communications systems specifically designed for local/metro area networks are, unfortunately, not capable of transporting the microwave and

Dec 27, 2025

The Definitive Guide to Passive Optical Network (PON): Architecture ...

Comprehensive guide to Passive Optical Network (PON) technology, covering GPON, EPON, XGS-PON, NG-PON2, and future 50G/100G standards. Learn PON architecture,

Jan 08, 2026

Improved performance analysis of Gigabit passive optical networks ...

Gigabit passive optical networks (GPON) provide a capacity boosts in both the total bandwidth and bandwidth efficiency through the use of larger variable-length packets in Passive

Nov 15, 2025

TRIMIS projects

The objective of the LOADNET project has been the identification, adaptation and installation of commercial off-the-shelf (COTS) networking components for optical avionics data networks.

Oct 18, 2025

Multi-gigabit WDM optical networking for next generation avionics ...

The paper begins by outlining the requirements and design constraints of an avionics network capable of functioning in the aerospace environment. Then, the progressive stages in the

Mar 09, 2026

Efficient polling cycle adaptive passive optical network for low ...

To meet the latency constraint and simultaneously improve bandwidth utilization, we propose a flexible time- and wavelength-division multiplexed passive optical network (TWDM-PON)

Oct 14, 2025

On-Board Fiber-Optic Network Architectures for Radar

Recent advances in fiber optic technology, especially wavelength division multiplexing (WDM), has opened a number of possibilities for designing

Dec 26, 2025

Photonic Integrated Circuits for Avionics Network Access and

This platform is also low loss and well suited for both WDM LAN node and printed circuit board-level optical signal distribution. Figure 4 shows an example PLC design incorporating AWG mux/demux

Nov 08, 2025

On-Board Fiber-Optic Network Architectures for Radar and Avionics ...

RF communication network on board modem-Civil and mili avionics systems can not implemented by existing coaxial cable based systems easily. Fiber-optic communication systems can meet all the

Jul 26, 2025

Scaling Star-Coupler-Based Optical Networks for Avionics Applications

Abstract In this work scaling of an optical broadcast-and-select network based on a passive star coupler is explored for avionics applications. Each client in the network is equipped with a transmitter unit

Aug 05, 2025

NPFONoC: A Low-loss, Non-blocking, Scalable Passive Optical

At present, high-blocking, large delay, and high insertion loss is the bottleneck of large-scale processor inter-core communication. This paper proposes a non-blocking, low-loss, scalable passive optical

Jul 12, 2025

Military avionics optical fiber data buses with active

To effectively solve this problem while maintaining a high reliability, we present several configurations of all-active couplers and hybrid passive/active

Jul 20, 2025

Passive Optical Networking for 5G and Beyond 5G Low

Abstract and Figures Passive optical network (PON) technology offers an attractive cost-efficient alternative to support 5G and Beyond 5G mobile

Feb 06, 2026

High Speed and Low Latency Passive Optical Network for 5G

We experimentally demonstrate the real-time packet transmission up to 50 Gb/s without packet loss during 48-hour through the channel bonding in a single optical distribution network (ODN) with 20 km

Jun 13, 2026

Capacity Optimization of the Next-Generation Passive Optical Networks ...

Increased bandwidth, reduced latency and symmetric downlink and uplink capacity are among the key drivers for Next-Generation Passive Optical Network (NGPON) technology while

Nov 05, 2025

Coherent Optics for Passive Optical Networks: Flexible Access ...

This surge in traffic has placed higher demands on the performance of optical networks, featuring higher data rates, lower latency, and lower cost. The passive optical network (PON) is a

Jul 13, 2025

Optical Network for Integrated Modular Avionics

This avionics passive optical network can fully utilize the advantages of optical network and reduce the cost of avionics system.

Dec 13, 2025

[2109.08989] Passive Optical Networking for 5G and Beyond 5G Low ...

Passive optical network (PON) technology offers an attractive cost-efficient alternative to support 5G and Beyond 5G mobile network fronthauling (MFH). However, MFH for such networks is

Feb 11, 2026

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A simple, reliable, and lightweight network that is free from the effects of electromagnetic interference and capable of supporting the broadband communications needs of future onboard digital avionics

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