# HSSub-6091 10G Ethernet Instrument

## Four Port PXI Express Instrument for 1G and 10G Ethernet

The HSSub-6091 provides the performance and flexibility to support the most demanding Defense and Aerospace Ethernet requirements. Supporting up to four concurrently operating ports at speeds up to 10Gb/s, this is the highest density instrument available in the 1-slot, 3U PXI Express form factor. Pluggable SFP/SFP+ transceivers support standard physical I/O requirements, both fiber optic as well as copper-based electrical. As a member of the Teradyne High Speed Subsystem (HSSub™) family, this instrument benefits from the proven power and flexibility of the HSSub Three Tier Architecture and the TriFlex™ subsystem-wide infrastructure software. The HSSub-6091 addresses immediate and future Ethernet requirements, avoiding the high cost of replacement due to technical obsolescence.

### FEATURES

- (4) Ethernet ports
- Pluggable SFP/SFP+ transceivers for flexible optical and copper-based I/O capability
- 1G/10G Optical support
- 1000BASE-T copper support
- Multiple concurrently operating buses
- Fully integrated DHCP, FTP, TFTP servers and NFS server & client

### BENEFITS

- HSSub App architecture avoids the risk and cost obsolescence from new or changing requirements
- Capable and flexible programming minimizes TPS development and support costs
- High production throughput minimizes equipment and labor costs
- Long-term product and service support minimizes logistics and TPS support costs over the platform lifecycle

### Background

The continuing trends in weapon system bus requirements include faster speed, higher bandwidth, and greater reliability. Defense and Aerospace assemblies are increasingly using Ethernet to address these needs at speeds up to 10Gb/s, replacing the slower parallel and serial buses of the past. It is common for an assembly to employ multiple I/O ports and a variety of bus types, including Ethernet. As speeds increase to 1Gb/s and beyond, copper cabling is being displaced by fiber optics. Most often, application-level access is provided by Upper Level Protocols that simplify TPS development by hiding complex low-level bus details. The HSSub-6091 is supported by integrated upper level standard services, and can be expanded using the proven HSSub architecture for custom applications.

### HSSub Architecture

HSSub employs a Three Tier Architecture consisting of:

1. **Low-level I/O Protocol Processing**
2. **Real-Time Computing**
3. **Windows™-based Resource Management and TPS development**

The HSSub TriFlex infrastructure software integrates all of the hardware. For a specific bus requirement, an HSSub App configures the hardware at each tier, and provides a conventional TPS programming interface on the Tier 3 Windows Computer.

The HSSub-6091 instrument addresses Tier 1, implementing the low-level Ethernet protocol using a server-grade Ethernet chipset that provides the highest possible density and performance. The instrument takes full advantage of the high bandwidth provided by PXI Express to avoid the bottlenecks that typically limit conventional products.

Ethernet applications depend on Upper Level Protocols to communicate with other assemblies within the weapon system. Most often, these protocols depend on standards such as FTP, TFTP, NFS, and DHCP which are provided on the Windows-based computer (Tier 3) by the HSSub TriFlex software. Increasingly, new Ethernet applications are being developed where real-time, fast, and repeatable operations are required that are beyond the capability of Microsoft Windows. These Upper Level Protocols may entail data processing, or communications operations. These protocols could be implemented in the HSSub Tier 2 Real-Time Computing

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layer, by pairing the HSSub-6091 with an HSSub-5020 Real-Time Processing Module in the HSSub. All of this functionality becomes embedded in an HSSub App, which is developed by Teradyne or end users.

The HSSub-6091 Ethernet I/O is provided by slots for SFP/SFP+ pluggable transceivers, each of which can be selected for copper-based electrical or fiber optic physical transmission.

## Summary

The HSSub-6091 addresses the requirements for increasingly fast Ethernet buses, both copper-based electrical or fiber-based optical transmission that are in new weapon system designs and many legacy platform upgrades. This instrument can be part of a complex integrated subsystem, or it can be used as an individual instrument. The HSSub App-based Three Tier Architecture supports requirements for custom Upper Level Protocols. Designed and supported specifically for the Defense and Aerospace market, the HSSub-6091 can provide the core functionality for these Ethernet requirements for decades to come.

## Specifications

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|---|---|
| PXI Characteristics | PXI Express (PCIe Gen 2 x4) 3U 1-slot |
| Front Panel Connectors | (4) independent SFP/SFP+ transceiver connectors |
| Optional VPC Funnel Interface | Virginia Panel Corp. i2 MX high cycle count, EMI protected optical interconnect adapter |
| Number of Ethernet Channels ***(Note 1)*** | (4) concurrent, independent channels |
| 10 GbE Optical I/O Support ***(Note 2)*** | 10GBASE-SR, 10GBASE-SW |
| 1 GbE Optical I/O Support ***(Note 2)*** | 1000BASE-SX |
| 1 GbE Copper I/O Support ***(Note 3)*** | 10000BASE-T |
| Protocol Support | TCP/IP (IPv4 and IPv6), UDP, DHCP server, FTP, TFTP, NFS Client/Server, DNS |
| Network Stack Control on HSSub PC | Standard Windows network stack |

## Part Numbers

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|---|---|
| 635-352-80 | HSSub-6091 10G Ethernet IO Expansion Instrument |
| 710-059-03 | Spare SFP+ Optical Transceiver |

***Notes:***

1. Total system bandwidth may be constrained by quantity of network traffic, backplane bandwidth, and PC processing capability
2. Supported by standard SFP+ transceivers (supplied with instrument)
3. Requires alternate SFP+ transceiver

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