Intel® IXF30009/30010/30011
Optical Transport Processors

Intel® optical components are modular building blocks that enable networking equipment manufacturers to create standards-based products with shorter time-to-market and reduced development costs. Developers can use these opto-electronic components to build optical network solutions to meet a variety of high-bandwidth requirements in SONET/SDH, Optical Transport Network or Ethernet networks.

Product Overview

The Intel® IXF30009/30010/30011 Optical Transport Processors are highly integrated devices designed to handle most Optical Transport Network (OTN) applications on a single chip. As a successors to the Intel® IXF30001, IXF30003, IXF30005, and IXF30007 devices, the Intel IXF30009/30010/30011 transport processors build on Intel's framer and Forward Error Correction (FEC) design expertise and extend the product family.

The Intel IXF30009/30010/30011 Optical Transport Processors provide strong FEC performance and support for networking standards such as OTN (G.709), SONET/SDH and 10Gigabit Ethernet (10GigE). The devices feature SFI-4 compliant interfaces that can be configured to support either a single 10Gbps signal or four 2.5Gbps tributary signals. They can perform fully transparent asynchronous aggregation of 2.5Gbps tributaries into a 10.7Gbps (OTU2) signal. The devices support full duplex operations for all datapaths, and all RX and TX ports can be configured independently. They can be used as SONET/SDH framers providing complete section and line termination for one OC-192/STM-64 or four OC-48/STM-16 signals.

The Optical Transport Processors can also be operated as bridge devices, transparently transporting any payload over a G.709-compliant network, as network nodes operating with OTN signals on all interfaces, as gateways between asynchronous OTNs interfacing between different carrier networks,

or as strong FEC devices, providing a net electrical coding gain of 10dB in Ultra Long Haul (ULH) or submarine systems.

Both interfaces (system and line) are equipped with a G.709-compliant FEC codec (RS-255/239) providing a net coding gain of ~6dB, allowing for a single-chip standard FEC regenerator. In addition, the line-side of the Intel® IXF30009/30011 contains a very strong, proprietary FEC code with a maximum net coding gain of 10dB supporting ULH and submarine applications. The FEC overhead information can be scaled to 4 percent, 7 percent, 15 percent, or 25 percent to support the various requirements of a 10GbE, Metropolitan Area Network (MAN), and ULH system respectively, while maintaining the G.709v2 frame format.
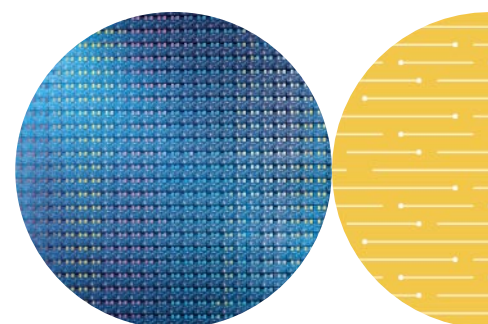
Product Overview (cont'd)

The flexibly of the configurable serial overhead port allows access to all transported client signals and management overhead data. FEC statistics are delivered to this port and can be used to control external compensation circuitries for optical impairments.

Compliance with OIF interface standards (SFI-4) enables the devices to be used in Multi Source Agreement (MSA) based systems. The single-chip integration support for multiple standards makes the Intel IXF30009/30010/30011 Optical Transport Processors the ideal high integration solution for a wide range of applications including OTN networks, FEC regenerators, Multi Service Provisioning Platforms (MSPPs), SONET/SDH Add/Drop Multiplexers (ADMs), submarine and ULH FEC applications, low cost 10Gbps metro and core networks, and 10GbE LAN transport and monitoring.

The Intel IX30009/30010/30011 transport processors are available in three, pin and software compatible, versions:

- **Intel® IXF30009 – Full functionality:**
  4x2.5G transparent aggregation into OxU2; supports 4xOC-48/OxU1, OC-192, OxU2, 10GE, Two G.709 compliant Reed Solomon FEC codecs; strong FEC performance of up to 10dB net electrical coding gain; adjustable FEC overhead rates; designed for Metro, Long Haul, ULH and Submarine networks.

- **Intel® IXF30010 – OTN:**
  Similar to IXF30009 without strong FEC support (only standard RS FEC).

- **Intel® IXF30011 – Strong FEC:**
  Similar to IXF30009 without support for 2.5G signals (excludes aggregation and OC-48/OxU1 processing).
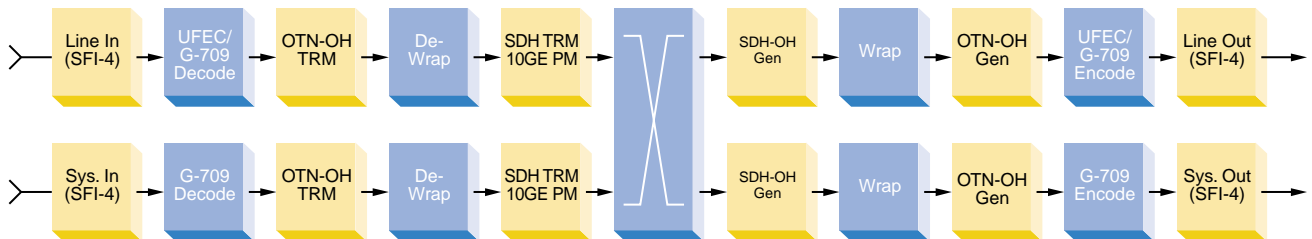
Features / Benefits

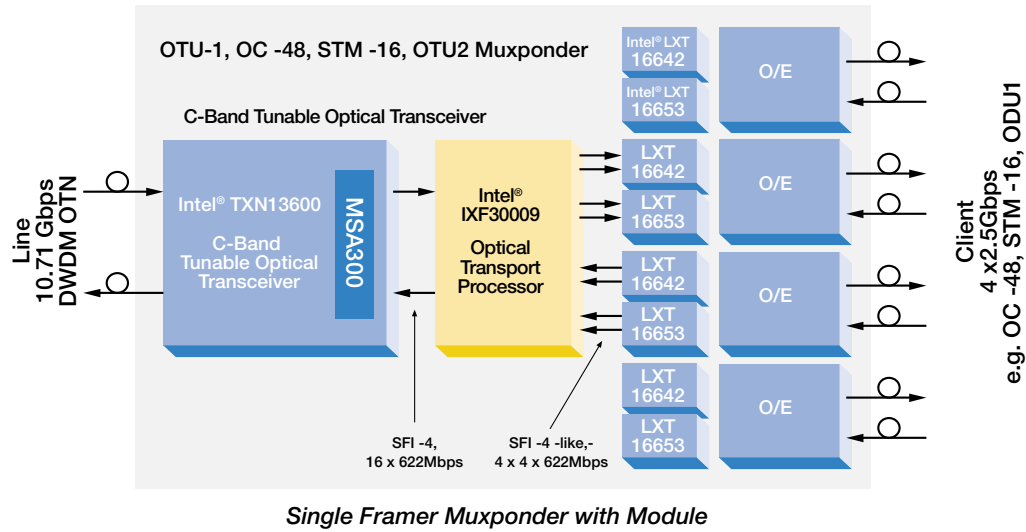| Features	Benefits
Fully transparent asynchronous aggregation of four 2.5Gbps tributary signals into an OTU2/ODU2	Enables more efficient bandwidth usage, leading to lower investment cost for transport systems. Allows direct connection of asynchronous lower rate client signals in a transport system that can be fully transparent and "invisible" to the payload.
Specific networking capabilities for 10GbE, SONET/SDH and OTN signals	Enables MSPPs capable of handling different client signals. The processor can be used as a full SONET/SDH framer for OC-48 or OC-192, monitoring 10GbE or processing OTN signals.
Strong, adjustable FEC	Provides superior coding gain and can be configured to meet the performance needs of a variety of platforms (Metro, LH, ULH, submarine). Enables denser packing of colors in a fiber to reduce equipment cost.
High integration networking support for different payloads including 10GbE and aggregation of multiple different signals	Supports high density boards (for example, an 8-port OC-48 framer) with greater real estate savings. Service providers can directly transport and monitor 10GbE payloads.
Pin and software compatibility throughout the product family	One board can be reused with different platforms (from Metro to ULH), helping to reduce cost. One software development, quick adaptation of new features into an existing platform (i.e. aggregation).

Key Applications

- Optical Transport Networks (OTN)

- Forward Error Correction (FEC) regenerators

- Multi Service Provisioning Platforms (MSPPs)

- SONET/SDH Add/Drop Multiplexers (ADMs)

- Submarine and ULH FEC

- Low cost 10G/2.5 G Metro and Core networks

- High density line cards for 2.5G networks
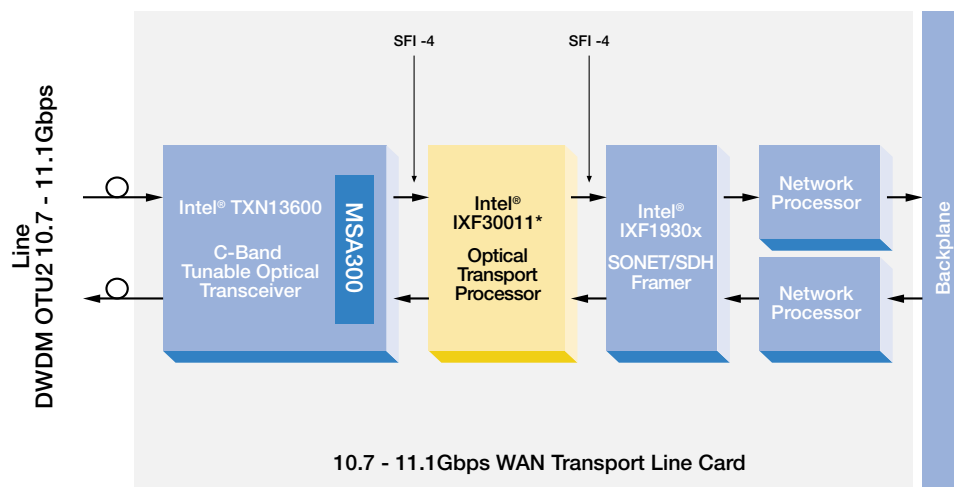 (4 bi-directional ports)

- 10GbE LAN transport and monitoring

Architecture Block Diagram

Line In (SFI-4)	UFEC/ G-709 Decode	OTN-OH TRM	De-Wrap	SDH TRM 10GE PM		SDH-OH Gen	Wrap	OTN-OH Gen	UFEC/ G-709 Encode	Line Out (SFI-4)
Sys. In (SFI-4)	G-709 Decode	OTN-OH TRM	De-Wrap	SDH TRM 10GE PM		SDH-OH Gen	Wrap	OTN-OH Gen	G-709 Encode	Sys. Out (SFI-4)

10G Metro Muxponder Line Card for MSPP and DWDM Systems

OTU-1, OC -48, STM -16, OTU2 Muxponder

C-Band Tunable Optical Transceiver

Intel® LXT 16642
Intel® LXT 16653
LXT 16642
LXT 16653
LXT 16642
LXT 16653
LXT 16642
LXT 16653

O/E
O/E
O/E
O/E

Line 10.71 Gbps DWDM OTN

Intel® TXN13600 C-Band Tunable Optical Transceiver

MSA300

Intel® IXF30009 Optical Transport Processor

Client 4 x2.5Gbps e.g. OC -48, STM -16, ODU1

SFI -4, 16 x 622Mbps

SFI -4 -like,- 4 x 4 x 622Mbps

Single Framer Muxponder with Module

OTN/SONET Router Line Card

SFI -4

SFI -4

Line DWDM OTU2 10.7 - 11.1Gbps

Intel® TXN13600 C-Band Tunable Optical Transceiver

MSA300

Intel® IXF30011* Optical Transport Processor

Intel® IXF1930x SONET/SDH Framer

Network Processor

Network Processor

Backplane

10.7 - 11.1Gbps WAN Transport Line Card

Intel Advantage

- The Intel IXF30009 is a G.709 compliant Optical Transport Processor, which covers most OTN applications on a single chip. It is the successor of Intel IXF30001/3/5/7 and builds on this expertise. In addition to previous devices the IXF30009 supports fully transparent asynchronous aggregation of four 2.5Gbps tributary signals into an ODU2 signal. It offers very strong proprietary enhanced FEC coding while maintaining the G.709v2 frame format. The FEC performance can be adjusted by changing the FEC overhead rate (for example, 4% , 7%, 15%, 25%) yielding a net electrical coding gain of up to 10 dB.

- Intel IXF30009 offers complete SONET/SDH section and line termination on all incoming signals, either OC-48 or OC-192, and can perform monitoring on 10GbE signals. The device I/Os are compliant to the OIF-standard SFI-4.

- The Intel IXF30010 and Intel IXF30011 devices are designed for 10Gbps and Metro applications, respectively, and provide low cost solutions.

10G Metro DWDM Muxponder Line Card for MSPP and DWDM Systems

Standalone FEC ASIC + IXF30009/30010 for transparent aggregation
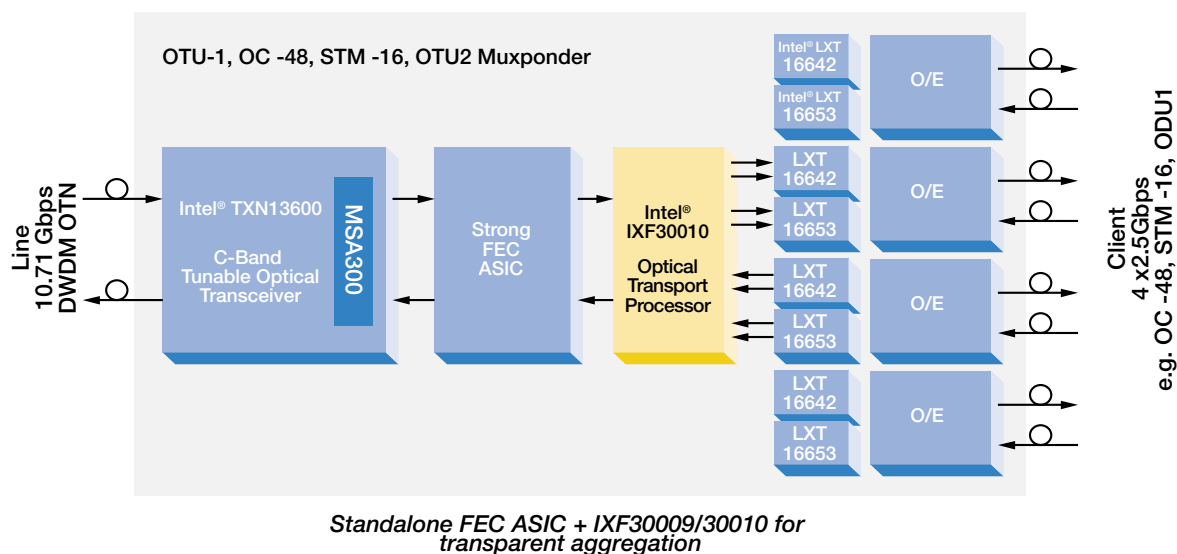
Support Collateral and Tools

Item	Description	Order Number
Datasheet		Contact Local Sales Rep
Evaluation Board		Contact Local Sales Rep
Hardware models (IBIS, BSDL)		Contact Local Sales Rep
PCB Layout guidelines		Contact Local Sales Rep
Application Programming Interface (API software)		Contact Local Sales Rep
API User Guide		Contact Local Sales Rep
Evaluation Board Data Sheet		Contact Local Sales Rep
Graphical User Interface (GUI)		Contact Local Sales Rep
Software Guide		Contact Local Sales Rep

Intel Access

Developer Web Site	http://developer.intel.com
Networking Components Home Page	http://developer.intel.com/design/network
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General Information Hotline	(800) 628-8686 or (916) 356-3104 5am - 5pm PST

For more information, visit the Intel Web site at: developer.intel.com

UNITED STATES AND CANADA
Intel Corporation
Robert Noyce Bldg.
2200 Mission College Blvd.
P.O. Box 58119
Santa Clara, CA 95052-8119
USA

EUROPE
Intel Corporation (UK) Ltd.
Pipers Way
Swindon
Wiltshire SN3 1RJ
UK

ASIA-PACIFIC
Intel Semiconductor Ltd.
32/F Two Pacific Place
88 Queensway, Central
Hong Kong, SAR

JAPAN
Intel Japan (Tsukuba HQ)
5-6
Tokodai Tsukuba-shi
300-2635 Ibaraki-ken
Japan

SOUTH AMERICA
Intel Semiconductores do Brasil LTDA
Av. Dr. Chucri Zaidan, 940-10⁰ andar
04583-904 Sao Paulo, SP
Brazil

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