Cisco 7600 IP Transfer Point

The Cisco® IP Transfer Point (ITP) for the Cisco 7600 Series Routers is a comprehensive carrier-grade product for transporting Signaling System 7 (SS7) traffic over traditional time-division multiplexing (TDM) networks or advanced SS7-over-IP (SS7oIP) networks. Because the Cisco 7600 ITP supports traditional, advanced, and combined traditional and advanced networks, operators can control their migration to advanced networks and make sure the transition supports business goals.

The Cisco 7600 ITP offers the complete feature set found in traditional signaling transfer points (STPs). When operating in TDM mode, the Cisco 7600 ITP provides superior value for transporting SS7 traffic over traditional TDM networks.

Using the standards developed by the IETF Signaling Transport (SIGTRAN) working group, in SS7oIP mode the Cisco 7600 ITP connects to traditional SS7 nodes or IP-enabled signaling nodes and offloads this SS7 traffic to reliable and cost-efficient IP networks, thus freeing capacity and ports on the costly SS7 network. The Cisco 7600 ITP also operates in mixed SS7oIP and TDM environments.

Additionally, by incorporating the SIGTRAN working group's Message Transfer Part Layer 3 (MTP3) User Adaptation Layer (M3UA) and Signaling Connection Control Part (SCCP) User Adaptation Layer (SUA) standards, the Cisco 7600 ITP provides complete signaling gateway functions between traditional TDM networks and IP-enabled signaling endpoints.

The Cisco 7600 ITP thus provides superior value over traditional SS7 transport solutions while providing the foundational infrastructure for the next generation of signaling transport.

Features and Benefits

Important features and benefits of the Cisco 7600 ITP include:

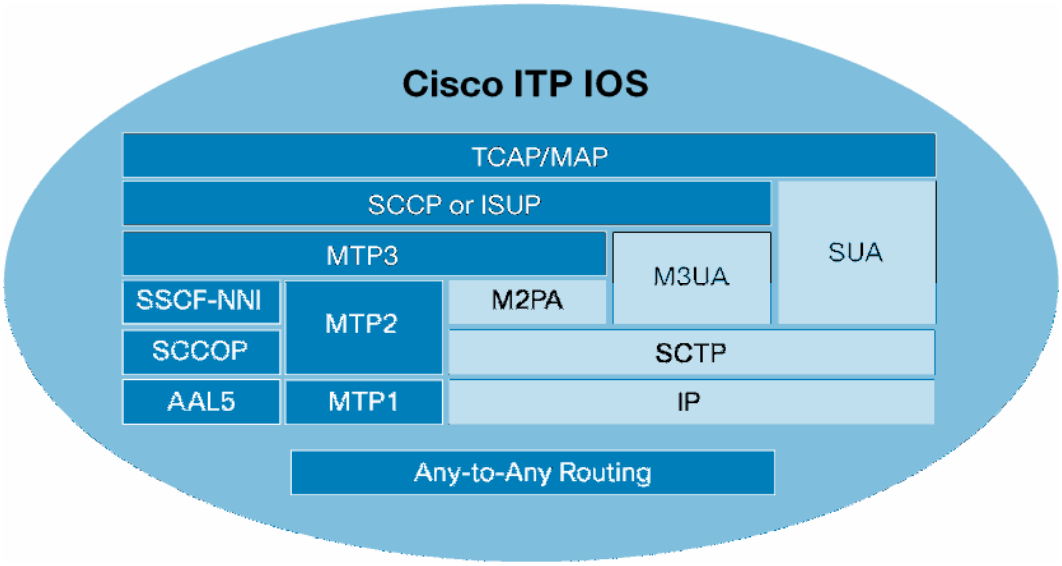
- Signaling infrastructure cost reduction
- Superior value and flexible scalability for signaling-capacity expansion, for TDM or IP
- Integrated, leading IP routing features, including IP WAN media support and quality of service (QoS)
- Reliability and performance characteristics demanded by signaling infrastructures
- ATM and Q703 Annex A high-speed link (HSL) support
- Traditional Signaling Transfer Point (STP) feature set, including Global Title Translation (GTT) and Gateway Screening (GWS)
- Open industry SIGTRAN standards, including SCTP, M2PA, M3UA, and SUA
- IP investment protection
- Portfolio of industry-leading traditional SS7 and SS7oIP solution partners
- Advanced Short Message Service (SMS) routing
- Mobile Application Part (MAP) operation code routing

- Origination Point Code and Destination Point Code (OPC-DPC) routing at MTP3 layer and SCCP layer (calling party address and called party address [CgPA-CdPA]) using multilayer routing
- Flexible multilayer screening capabilities
- Gateway STP functions, including concurrent multiple variants and conversion
- Flexible Numbering, using Application Routing Director (ARD), and Mobile Number Portability (MNP)
- Support for Nondisruptive Upgrade (NDU)

Protocol Specifications and Compliance

Figure 1 shows the basic protocol architecture of a Cisco 7600 ITP and its any-to-any switching capability.

Figure 1. Cisco 7600 ITP Architecture



Tables 1 through 9 provide more information:

- Table 1 lists protocol compliance.
- Table 2 outlines the general platform specifications.
- Table 3 describes SS7 interface support.
- Table 4 details the Cisco 7600 ITP capacity and performance.
- Table 5 lists database tables capacity.
- Table 6 describes Cisco 7600 ITP software features.
- Table 7 lists the IP routing protocols supported
- Table 8 describes Cisco IOS® Software QoS features
- Table 9 identifies other Cisco IOS Software features

Table 1. Protocol Compliance

Protocols	Industry Specifications
MTP (1, 2, and 3)	TTC, JT-Q704(v3 2002/5/30), JT-Q703(v3 1994/4/27), JT-Q702(v1 1987/4/28), and JT-Q701(v2 1990/11/28)
SCCP	ITU-T Q.711-Q.719 White 1996 (interworks with Blue) and ANSI T1.112-1996
TCAP	TCAP: ITU-T Q771-775 (White book, June 1997) and ANSI T1.114 1996
HSL (ATM AAL5 over T1, E1 or OC3/STM-1)	Q.2100, Q.2140, Q.2110, Q.2210, Q.2144, JT-Q2210, JT-Q2140, JT-Q2110, JT-I363.5/JTQI361, GR-2878, I.363.5, and I.361
HSL (Q703 Annex A multichannel E1)	ITU-T Q703 Annex A, White 1996 (interworks with Blue)
M2PA	IETF RFC 4165: SIGTRAN SS7 MTP2-User Peer-to-Peer Adaptation Layer
M3UA	IETF RFC 4666: SIGTRAN SS7 MTP3-User Adaptation Layer
SUA	IETF RFC 3868: SIGTRAN SS7 SCCP-User Adaptation Layer
SCTP	IETF RFC 2960: Stream Control Transmission Protocol IETF RFC 3309: Stream Control Transmission Protocol Checksum Change
MAP	03.40 ETSI Document TS 100 901 V7.5.0

Platform Specifications

The Cisco 7600 ITP is implemented on the Cisco 7604, Cisco 7606-S, Cisco 7609-S, and Cisco 7613 Routers. This data sheet specifically discusses the Cisco 7600 ITP. Please refer to the Cisco ITP data sheet for technical information related to the other Cisco ITP platforms.

Table 2. Platform Specifications

Attribute	Cisco 7604	Cisco 7606-S	Cisco 7609-S	Cisco 7613
Dimensions (H x W x D)	8.8 x 17.5 x 21.8 in. (22.2 x 44.5 x 55.3 cm)	12.3 x 17.4 x 21.8 in (31.1 x 44.1 x 55.3 cm)	36.8 x 17.2 x 20.7 (93.3 x 43.1 x 53.3 cm)	33.3 x 17.2 x 18.1 in. (82.3 x 42.5 x 44.7 cm)
Rack units (RU)	5RU	7RU	21RU	19RU
Dual processor	Yes	Yes	Yes	Yes
Dual power	Yes	Yes	Yes	Yes
Network Equipment Building Standards (NEBS)3	Yes	Yes	Yes	Yes
Main processor	SUP720-3B and 3BXL	SUP720-3B and 3BXL	SUP720-3B and 3BXL	SUP720-3B and 3BXL
Main processor flash memory	512 MB	512 MB	512 MB	512 MB
Main processor DRAM (minimum)	512 MB	512 MB	512 MB	512 MB
Main processor DRAM (recommended)	1 GB	1 GB	1 GB	1 GB
FlexWAN SDRAM (minimum)	512 MB per bay	512 MB per bay	512 MB per bay	512 MB per bay

Note: RAM and flash memory requirements are determined by operational requirements for maximum capacity. Cisco IOS Software images, routing tables, GTTs, and run-time data structures consume memory.

Table 3. SS7 Interfaces Supported

Interface Type	Cisco 7600 Series Interface Card
Channelized T1/DS-0 and E1	PA-MCX-8TE1-M
HSLs (ATM over T1/E1)	PA-A3-8T1IMA and PA-A3-8E1IMA
HSLs (Q703)	PA-MCX-4TE1-Q
STM-1 and ATM-HSL	PA-A6-OC3 (MM, SMI, and SML)

T1 Compliance

- ANSI T1.403
- United States (UL 1950, 1459, and T1)
- Federal Communications Commission (FCC) Part 68
- Canada (C1950 and T1)
- Unites States (FCC part 15J Class A, and T1)
- United Kingdom (BS6301, EN60950, and EN41003)
- Canada (CSA C108.8 Class A, and T1)
- Bellcore-AT&T Accunet (62411)
- ATT 54016
- Japan (VCCI Class 2, and T1)

E1 Compliance

- Germany (TUV GS)
- Germany (VDE 0878 parts 3 and 30)
- France (NFC98020)
- France (EN60950 and EN41003)
- Sweden (SS447-2-22)
- Europe (EN55022 Class B, EN55102-1, and EN55102-2)
- CCITT/ITU G.703, G.704, and I.431
- ETSI NET5 and ETS300156
- CTR-4 and CTR-12
- TBR-13
- ETS 300011
- ITU I.431

IP Media Support

- Fast Ethernet, Gigabit Ethernet
- ATM over T1, E1, OC-3 single mode, and OC-3 multimode
- T3/E3

Note: SS7 over IP (SCTP, M2PA, M3UA, and SUA) is supported over 100-MB and 1-GB Fast Ethernet, ATM OC-3 single mode, ATM OC-3 multimode, and T3/E3. Support for other media types is considered upon request.

Capacity and Performance Specifications

- Individual links are capable of running at 1.0 Erlang.
- Traffic rates shown in Table 4 are 100 bytes, without GTT.
- Performance data in Table 4 is bidirectional (that is, 28,000 message signal units (MSU) per second means 28,000 MSUs received, serviced by the Cisco ITP, and subsequently transmitted per second; not 14,000 MSUs received plus 14,000 MSUs transmitted).
- The SCTP associations limit is 1000 per ITP and 100 per processor.
- Multilayer routing introduces a typical 10 percent processor overhead in addition to any required GWS triggers.
- GTT introduces a typical 20 percent processor overhead.
- GWS introduces a typical 15 percent processor overhead. GWS logging introduces an additional 10 percent overhead.

Table 4. Capacity and Performance Using the Cisco 7600 IP Transfer Point with Enhanced FlexWAN

Maximum Number Of:	Per FW PA	Cisco 7604 Router	Cisco 7606 Router	Cisco 7609 Router	Cisco 7613 Router
Low-speed TDM links	126	504	1008	1764	2772
M2PA links	100	400	800	1000	1000
HSLs (ATM)	8	32	64	112	176
HSLs (Q703 Annex A)	4	16	32	56	88
Low-speed TDM links MSUs per second	7,000	28,000	56,000	98,000	154,000
HSLs (ATM) MSUs per second	10,000	40,000	80,000	140,000	220,000
HSLs (Q703) MSUs per second	9,000	36,000	72,000	126,000	198,000
M2PA MSU per second	6,750	27,000	54,000	95,000	150,000
M3UA MSUs per second	7,500	30,000	60,000	105,000	165,000
SUA MSUs per second	5,000	20,000	40,000	70,000	110,000
Offloaded MO-Proxy/ SMS-Not Feature (trans/sec)*	150	600	1200	2,100	3,300

*NOTE: Transaction Per Sec (TPS) is measured with 100% stateful traffic.

SIGTRAN Performance with the Service and Application Module for IP (SAMI)

Effective with Cisco IOS Release 12.2.33IRA for the Cisco ITP, the Cisco 7600 ITP supports the Service and Application Module for IP (SAMI) card for high-capacity SIGTRAN traffic processing. Supporting the M2PA, M3UA, and SUA protocols concurrently, each SAMI card supports the following:

- With GTT, Multilayer Routing (MLR), and GWS features enabled, each SAMI card supports up to 50,000 MSUs per second of 100-byte MSUs.
- If GTT is not required, per-SAMI-card capacity increases by 20 percent.
- If MLR is not required, per-SAMI-card capacity increases by 10 percent.
- If GWS is not required, per-SAMI-card capacity increases by 15 percent.

These increases are additive so that if no services are required, each SAMI card supports a total of 75,900 MSUs per second.

Table 5. Cisco 7600 ITP Database Tables Capacity

Tables	Cisco 7600 ITP Concurrent Capacity
Routesets	10,000 (5 routes per set)
GWS rules	35,000
GTT entries	200,000
MAP entries	3000
Application Groups	3000
Application Group members	25,000
M3UA and SUA Routing Keys	5000
MLR entries	25,000

Table 6. Cisco 7600 ITP Software Features

Feature	Cisco 7600 ITP Capability
SS7 routing	SCCP, GTT, and MTP3 any-to-any routing between all link types including OPC-DPC-based routing using MLR
QoS	QoS per SCTP association with classification based on: • Service indicator • DPC, Global Title Address, and M3UA and SUA routing keys • Input link set • Service (translation type) • Access lists • M3UA and SUA routing keys
GTT support	• Full traditional SCCP and GTT support including ANSI GTI2 and ITU and China GTI 2 and 4 • Address translation and variant and instance conversion
GWS	ITP GWS is an advanced STP screening capability. At any stage during the screening process, the message can be routed to its destination, sent to MLR for application level handling, or discarded. This function supports combinations of the following MSU parameters: MTP3 layer, SCCP layer, ISUP message type, byte pattern, and byte offset. In addition to GWS, Cisco ITP supports MLR-based screening features. More information about the MLR feature is provided later in this table.
SS7 load sharing	Advanced MTP3 and SCCP load sharing for links, link sets, and combined link sets for any link types
Multiple point codes	Primary, secondary, and capability point codes and M3UA and SUA routing keys; with the multiple instances feature, up to 256 TDM links to adjacent nodes
Multiple instances	This feature enables multiple variant and network-indicator combinations to run concurrently on one Cisco 7600 ITP. Up to eight instances can be configured. Each instance is a separate domain with a defined variant, network indicator, Cisco 7600 ITP point code, optional capability point code, and optional secondary point code. • Instance translation: Enables the conversion of packets between instances of the same variant • Instance conversion: Enables conversion between ITU, ANSI, China, and TTC instances for MTP-routed and GT-routed traffic • Inter-instance GTT: Enables the results of GTT to be the point code of another instance, thus sending the traffic to the other instance for subsequent GTT processing
MLR	This feature enables intelligent routing and screening of all SS7 messages at the MTP, SCCP, TCAP, and MAP user layer based on a flexible schema including, but not limited to, OPC, DPC, SI, CdPA, and CgPA parameters and any TCAP-layer operation code, providing very granular control of specific message flows. For SMS-specific operation codes, such as mobile-originated and mobile-terminated (MO-MT) messages, MLR allows routing on additional MAP user layer parameters: for example, sending short message entity (SME), destination SME, originating IMSI, and MAP layer service center addresses. MLR supports IS-41 SMS message routing, next to full operation code routing for Global System for Mobile Communications (GSM).
Mobile-originated (MO) Proxy	Enables the routing of segmented GSM MAPv2 and later messages based on application layer parameters by terminating the MO dialogue. This capability helps ensure that the SMS MO dialogues for a given B-address are handled by the same SMS center (SMSC). This feature can be distributed to the FlexWan CPUs for greater scalability.

SMS notification proxy	This feature broadcasts incoming ANSI-41 SMS Notifications to a group of SMSCs and provides a reply to the Home Location Register (HLR) after receiving the first positive acknowledgment message from any of the SMSCs in the distribution. This feature can be distributed to the FlexWan CPUs for greater scalability.
Network management and monitoring	Simple Network Management Protocol (SNMP) based network management for nodes, links, and routes (using a GUI) interoperates with CiscoWorks, CiscoView, and HP OpenView products. For additional information, please refer to the Mobile Wireless Transport Manager Product section later in this document.

Table 7. IP Routing Protocols

Protocol	Definition
BGP	Border Gateway Protocol
EIGRP	Enhanced Interior Gateway Routing Protocol
OSPF	Open Shortest Path First

Table 8. Standard Cisco IOS Software QoS Features

QoS Feature	Description
Class-based traffic treatment	Industry-leading class-based matching, marking, queuing, and scheduling
CAR	Committed access rate
DiffServ	DiffServ-compliant weighted random early detection (WRED)
Flow-based WRED	Flow-based WRED
Traffic shaping	Generic traffic shaping
LLQ	Low-latency queuing
RED/WRED	Random early detection and WRED

Table 9. Other Cisco IOS Software Features in the Cisco 7600 ITP

Feature	Description
AAA	Authentication, authorization, and accounting
Access lists	Access lists
Cisco Discovery Protocol	Cisco Discovery Protocol
NTP	Network Time Protocol
RADIUS	Remote Authentication Dial-in User Service
SNMP	SNMP, SNMPv1, and SNMPv2C
TACACS	Terminal Access Controller Access Control System, TACACS SENDAUTH function, and TACACS single connection

Cisco Mobile Wireless Transport Manager

Cisco Mobile Wireless Transport Manager (MWTM) Release 6.1 provides monitoring and management capabilities to Cisco ITP solutions. Cisco MWTM addresses the element-management requirements of mobile operators and provides fault, performance, configuration, and troubleshooting capability as mobile operators make the transition from first-generation fixed leased-line networks to a converged IP-based infrastructure.

Features

Table 10 lists new features available with Cisco MWTM 6.1.

Table 10. Cisco MWTM 6.1 Features

Features	Description
Extensive Cisco ITP support	Supports all Cisco ITP platforms: • Cisco 2811 Integrated Services Router • Cisco 7204VXR and 7206VXR Routers • Cisco 7301 Router • Cisco 7600 Series Routers
Event monitoring	• Displays a real-time event list that supports acknowledgement, annotation, customized filtering, and field viewing that conform to ITU-T X.733 standards • Receives native traps from hardware devices in the Cisco ITP solution and uses SNMP polling to identify the status of each managed Cisco ITP device and the status of links and link sets; Cisco MWTM uses easy-to-recognize, color-coded icons to report the status
Wizard-based provisioning	Assists in provisioning DPC route tables, GTT tables, MLR address tables, application servers, application server processes, interfaces, links, and link sets by providing GUI-based editing; reduces errors by checking syntax and semantics before deploying the tables to the Cisco ITP device
Performance reporting	• Provides extensive Web-based accounting and network statistics reports • Displays real-time data rate and usage line graphs • Includes network efficiency and detailed interface-level statistics as well as Q.752-based statistics reports and point code inventory reports including MTP3, GTT, M3UA or SCCP SUA), MSU, and multilayer routing reports
Autodiscovery and topology	Discovers the entire Cisco ITP network and displays each network element, neighboring equipment, and physical and logical connectivity in a network topology drawing that users can customize
Troubleshooting	Reduces the total time to resolution of network and device problems through customizable troubleshooting tools
OSS integration	• Receives SNMP traps and generates traps specific to Cisco MWTM for forwarding to external SNMP-based network management applications such as Cisco Info Center and IBM Tivoli Netcool • Statistics are stored in comma-separated value (CSV) format files for extracting performance and key performance indicator (KPI) metrics information • Northbound: Cisco ITP XML and Simple Object Access Protocol (SOAP) APIs for events, traps, and inventory allow third-party OSs to programmatically manage events by retrieving a list of events or providing access to inventory data • Northbound: Cisco ITP provisioning XML and SOAP APIs allow third-party OSs to programmatically configure Cisco ITP tables and objects
Security	• Supports multiple user-authentication methods: OS based and standalone • Optional Secure Sockets Layer (SSL) based encryption between client and server supports optional Secure Shell (SSH) Protocol based encryption between the server and network element
Client-server architecture and OS support	Depending on the client-server architecture, Cisco MWTM supports Microsoft Windows and Solaris clients and Solaris and Linux servers and provides data access through a web browser.

For more information about Cisco MWTM, please visit www.cisco.com/go/mwtm.

System Availability Metrics

The Cisco 7600 ITP increases the system capacity and availability of the Cisco 7600 Series Routers by providing full redundancy and nondisruptive software upgrades. The Cisco 7600 Series is widely deployed in industry segments that require a carrier-class, highly reliable, and highly available platform.

Cisco monitors mean time between failure (MTBF) and mean time to repair (MTTR) data for Cisco 7600 Series hardware and software in large service provider networks. Results show that a single Cisco 7600 ITP achieves:

- 99.999% availability with an MTTR of 4 hours and,
- 99.9999% availability with an MTTR of 30 minutes

Mated-pair Cisco 7600 ITP system availability far exceeds 99.9999 percent.

Ordering Information

To place an order, visit the Cisco Ordering homepage and consult Table 11.

Table 11. Cisco 7600 ITP Ordering Information

Product Name	Part Number
Cisco 7600 IP Transfer Point	S76ITPK9-12218IXG, S76ITPK9-12233IRB

Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information about Cisco services, see Cisco Technical Support Services or Cisco Advanced Services.

For More Information

For more information about Cisco mobile wireless products and solutions, including the Cisco 7600 ITP, please visit http://www.cisco.com/en/US/products/sw/wirelssw/ps1862/index.html.

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