COMPAQ

Software Product Description

PRODUCT NAME: IN7
Version 4.0

SPD 34.19.09

DESCRIPTION

Compaq *IN7* is a communications software product that implements the Signalling System 7 protocol. It allows Microsoft® Windows NT®[1] INTEL®[2] based PCs, Compaq *Tru64 UNIX*®[3] *Alpha* system-based and *OpenVMS Alpha* system-based telecommunications applications to be connected to Signalling System Number 7 (SS7) networks that conform to ITU Blue Book and ITU-T White Book Recommendations (International Telecommunications Union Telecommunications Standardization Sector; ITU-T, formerly known as CCITT) or American National Standards Institute (ANSI) (1988 and 1996) Standards and also to:

- ITU Blue Book (1988) and ITU-T White Book (1992) Recommendations for TCAP
- ITU-T 1996 for SCCP Global Title translation and Segmentation and Reassembly features
- ITU Red, Blue, or ITU-T White Book Recommendations for MTP Adjacent Restart
- ANSI 1988 and 1996 Standards for TCAP
- ANSI 1996 Standards for SCCP Global Title translation and Segmentation and Reassembly features
- The European Telecommunications Standards Institute (ETSI) 1991 Standard
- the ETSI Standard 300 374-1 September 1994 Core INAP CS.1 (for *IN7* on the *Tru64 UNIX* operating system only)
- The Chinese Technical Specification document GF001-9001 issued by the Ministry of Posts and Telecommunications of the People's Republic of China (for *IN7* on *Tru64 UNIX* and *OpenVMS* operating systems only)
- The EIA/TIA Interim Standards IS-41.1-C, IS-41.2-C, IS-41.3-C, IS-41.4-C, and IS-41.5-C for Cellular, Radio Telecommunications Intersystem Operations (for *IN7* on *Tru64 UNIX* and *OpenVMS* operating systems only)

See the *IN7* Statement of Compliance for the appropriate protocol variant for further details.

The aim of *IN7* is to provide Signalling Point functions to applications that use the Signalling System 7 protocol. Application Programming Interfaces are available to the application programmer at the MTP3, SCCP, and TCAP levels of the protocol and at the management and administration level of the platform. There is also an API for the IS-41 (Revision C) Mobile Application Part (MAP) for *IN7* on *Tru64 UNIX* and *OpenVMS* operating systems only; this API uses ANSI TCAP. For *IN7* on the *Tru64 UNIX* operating system only there is an INAP SRF API that uses ITU-T TCAP.

IN7 on the Microsoft Windows NT operating system and the *Tru64 UNIX* operating system can also interact with TCP/IP networks in compliance with the Bellcore ISCP Generic Data Interface (GDI) Specification for TCP/IP, SR-3389, TCP/IP Transport Protocol Specifications Version 5.0.

IN7 allows extremely high levels of availability to be obtained by implementing a distributed configuration, where all components (software or hardware) can be replicated for redundancy.

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In addition, the Application Copy Failover (ACF) facility available on *Microsoft Windows NT* and *UNIX IN7* platforms ensures the quasicontinuous availability of service applications deployed in Advanced Intelligent Network (AIN) and Intelligent Network (IN) infrastructures.

IN7 is shipped with a Graphical User Interface (GUI) for configuring an IN7 platform as a Signalling Point in an SS7 network. The GUI is also used to configure TCAP and INAP SRF applications for a GDI TCP/IP network.

Environment

IN7 provides end-node connectivity to a Signalling System 7 network, as well as SCCP Relay Point functionality. Examples of where such connectivity can be used are "Home Location Registers" (HLR), "Authentication Centres" (AuC) and "Equipment Identity Registers" (EIR) in Mobile Networks, and "Service Control Points" (SCP) or Intelligent Peripherals (IP) in Intelligent Networks.

IN7 on Microsoft Windows NT can also provide connectivity to TCP/IP networks for TCAP applications. *IN7* on the *Tru64 UNIX* operating system can provide connectivity to TCP/IP networks for TCAP and INAP SRF applications.

Three major types of functionality compose the *IN7* product. The *IN7* Front-End Process (FEP), provides connectivity. The *IN7* Back-End Process (BEP), provides access to one or more of the *IN7* service APIs. The Director Process (DIR) provides access to the Management API.

The ACF Server function implements the ACF facility and allows TCAP and TCAP-based service applications to save dialogue contexts and timers.

Table 1 shows which APIs are available on which operating systems.

Table 1
API Availability

API	Windows NT	UNIX	OpenVMS
Management	Yes	Yes	Yes
MTP3	Yes	Yes	Yes
SCCP	Yes	Yes	Yes
TCAP	Yes	Yes	Yes
IS41-C	No	Yes	Yes
INAP SRF	No	Yes	No
ACF	Yes	Yes	No

The *IN7* functions can be coresident on the same machine or distributed across several machines, supporting multiple copies of applications and multiple access links across multiple machines.

Compaq recommends that the ACF Server function is installed on a dedicated machine and that an *IN7* platform using the ACF facility includes more than one dedicated ACF Server machine.

Components

IN7 implements the following functions (refer to Statement of Compliance Documents):

- **Message Transfer Part Level 1 (MTP1)**
  IN7 supports E1 or T1 Trunk connectivity or V.35 connectivity to SS7 networks.

E1/T1 Trunks

— The *DNBE1* Communications Controller on a PCI bus, which supports up to 31 timeslots and bit rates of 64K bps for each timeslot.

The following physical connections are possible for the *DNBE1* device:

DNBE1-AB (75 ohm)

— The DB9 connector on the card.

In the normal configuration only port 0 (b) is used. (The use of port 1 (a) is reserved.)

— A DB9 break-out cable (DNBE1-TA) providing standard coaxial connections can be ordered separately.

In the normal configuration only coaxial cables labelled TXD-B and RXD-B are used. The use of the other two coaxial cables is reserved.

The number of devices is limited by the number of PCI slots available in the machine.

DNBE1-AA (120 ohm)

— RJ48C standard E1 connector; port 0 (b) only is used. (The use of port 1 (a) is reserved.)

— The *DNBT1* Communications Controller (**DNBT1-AA**) on a PCI bus, which supports up to 24 timeslots and bit rates of 64K bps or 56K bps for each timeslot.

The following physical connections are possible for the *DNBT1* device:

— RJ48C standard T1 connector; port 0 (b) only is used. (The use of port 1 (a) is reserved.)

The number of devices is limited by the number of PCI slots available in the machine.

DNBT1 and *DNBE1* devices are available in Entry Level or High Performance versions. Entry Level devices can process up to 500 Transactions per Second (TPS); High Performance devices can process up to 850 TPS.

V.35 connectivity

— the *DNBC4*-AA Communications Controller on a PCI bus, which supports four channels and bit rates up to 64K bps for each channel.

The following physical connections are possible for the *DNBC4* device:

— The 80-pin connector on the card

— The standard V.35 connector (M-34 connector; ISO 2593) provided with the hydra cable for the *DNBC4* device, DNBC4-TA, which must be ordered separately

— E1 and T1 connections with the use of a multiplexer.

The number of devices is limited by the number of PCI slots available in the machine.

IN7 also supports TCP/IP connectivity on the Microsoft Windows NT and the *Tru64 UNIX* operating systems, provided that the appropriate platform and management configuration options are applied.

- **Message Transfer Part Level 2 (MTP2)**

  IN7 implements:

  — The Basic Error Correction method.

  — Local Processor Outage (LPO) and Local Processor Recovered (LPR), for DNB E1 and T1 devices only, in compliance with the ITU-T Recommendations Q703 and Q704 and the ANSI Standards T1.111.3 and T1.111.4

  — Buffer flush in compliance with the ITU-T Recommendations Q703 and Q704 and the ANSI Standards T1.111.3 and T1.111.4

The Transmit and Retransmit buffers are flushed if Local or Remote Processor Outage is long term (the MTP3 T1 timer expires).

For DNB E1 and T1 devices only, *IN7* automatically reconfigures the MTP2 level after a firmware reset and notifies the FEP process, so that the relevant data links are put out of service and the associated MTP3 links assume the status FAILED if they were previously available. An event is raised to signal this situation.

- **Message Transfer Part Level 3 (MTP3)**

  Discrimination: *IN7* implements end-node functions. The use of multiple Point Codes allows an *IN7* platform to be connected to several networks at the same time.

  Distribution: *IN7* implements multiple MTP user parts, one of which is SCCP.

  Routing: Associated and Quasi-Associated modes are supported. The maximum number of Destination Point Codes (DPCs) is set at configuration time. There is no logical limit on the number of allowed DPCs. There may be up to 16 routes per DPC for ITU-T or 32 for ANSI, with a single linkset per route. The method of load-sharing or priority resolution performed across routes for a DPC or across links for a linkset is modifiable.

  Congestion: *IN7* V4.0 provides two options:

  — International congestion option for ITU-T and CHINA

  — National congestion option with multiple thresholds and priority for ANSI

  Traffic Management: All procedures are implemented except for local MTP Restart.

  Link Management: *IN7* implements the basic link management procedures.

  Route Management: Transfer Allowed, Transfer Restricted and Transfer Prohibited messages are received and processed for destinations and clusters according to the ANSI Standards. The Route-Set-Test procedure is implemented.

  IN7 complies with the ANSI (1996) Standard for MTP3. The Signalling Link Selection (SLS) is passed as a parameter encoded on 8 bits in the SCCP and TCAP APIs to enable the choice of route and link to be made independently of each other.

  For the ANSI version of *IN7* V4.0 the following features are available for cluster messages:

  — The handling of messages on a cluster basis

  — Signalling Route management for the cluster

  — Dynamic destination management for unknown destinations in a known cluster.

  Testing and Maintenance: *IN7* implements the procedures described in the Q.707 Recommendation. This is used for putting links into service and processing Adjacent Signalling Point Restart procedures.

  Multiple Point Code (PC): *IN7* supports multiple PC functionality that allows SS7 networks to address an *IN7* platform using different PCs. A maximum of 128 PCs can be defined for a platform.

- **Signalling Connection Control Part (SCCP)**

  IN7 implements the two connectionless classes: Class 0 (Basic) and Class 1 (Sequenced).

  IN7 supports the full Global Title Translation functionality for incoming and outgoing messages based on the ITU-T February 1996 Recommendations and the ANSI 1991 Recommendations. The translation is configured dynamically through the *IN7* Management interface. The maximum number of translation rules is 4000. *IN7* also supports the SCCP relay function: it is able to reroute incoming messages for which the Global Title translation gives another PC.

  IN7 supports Segmentation and Reassembly features that allow an SCCP user to request transfer of up to 2560 octets of user data. When the SCCP level receives a message containing a large amount of user data, it splits it into several Extended Unit Data (XUDT) messages and sends these segments to the SS7 network. When extended messages are received on the same FEP, the reassembly process builds a single message that is transferred to the SCCP user.

  Segmentation and Reassembly features are supported by the *IN7* ITU-T, CHINA, and ANSI protocol variants. These features are based on the ITU-T February 1996 Recommendations or the ANSI (1996) Standards. *IN7* is prevented from sending extended messages to PCs that do not support reassembly features.

  IN7 offers a congestion management facility at the SCCP level and above for the ITU-T and CHINA protocol variants. The SCCP Congestion Management (SCM) facility is not related to any ITU-T Recommendations and is implemented as a configurable option.

- **Transaction Capabilities Application Part (TCAP)**

  A White Book implementation is provided at this protocol level for the ITU-T protocol variant. The ANSI protocol variant can conform to the ANSI (1988) and the ANSI (1996) standards for the TCAP level.

  IN7 V4.0 implements both the structured dialogue and the unstructured (unidirectional) dialogue options. The indefinite length form is accepted in reception. Through the *IN7* application interface two types of primitive are provided: dialogue-handling primitives and component-handling primitives.

  On the Microsoft Windows NT and the *Tru64 UNIX* operating systems, the same *IN7* platform can be connected to both SS7 and TCP/IP networks, so that a TCAP application can interact with one or other network or both networks. When the TCAP on TCP/IP feature is active the *IN7* front-end SCCP and MTP levels are complemented by TCP/IP as specified in the Bellcore Generic Data Interface (GDI) specification.

- **IS-41 (C) Mobile Application Part (MAP)**

  IN7 supports Interim Standard (IS)-41, Revision C. IS-41 specifies the American system for digital mobile communications. IS-41 is supported on the *IN7* ANSI protocol variant on *Tru64 UNIX* and the *OpenVMS* operating systems only.

- **Intelligent Network Application Protocol (INAP)**

  IN7 supports the INAP SRF level as described in the ETSI standard (300 374-1) for Core INAP CS.1. *IN7* INAP SRF allows Intelligent Peripheral (IP) applications to establish INAP dialogues with an SCF. INAP SRF is supported on the *IN7* ITU-T protocol variant and the *Tru64 UNIX* operating system only.

  INAP SRF applications can also be configured to interact with TCP/IP networks.

- **Management**

  Any component of *IN7* is an entity that can be controlled and monitored: in particular, the applicable measurements specified in the Q.791 Recommendation are made accessible; similarly, any event (for example, link failure) can be reported.

  The global view feature allows management of all the running FEPs with the same command, regardless of the number of FEPs running when such a command is issued. The global view feature also provides for the consolidation of an entity's counters, whatever the number of FEPs running on the platform. The SHOW AND RESET function allows an entity's counters to be reset to 0.

  The full AutoReconfiguration facility makes use of the distributed management of the FEPs provided through global view. Should you need to rerun the management configuration of a platform for any reason, it is possible to execute the management configuration commands for the network connectivity (FEP subsystem) and service application (BEP subsystem) functions automatically using only one management command that reloads the configuration.
  The automatic reconfiguration of these functions includes the FEP and BEP entities and their child entities. AutoReconfiguration of the FEP entity hierarchy can include restoring event and SCCP message reporting. AutoReconfiguration of the service application function can be targeted at any failed part of the BEP entity hierarchy. It can be limited to the BEP_SUBSYSTEM entity if the applications it supports are still running and configured or to the child

entities representing the services played by one or more failed application copies.
The AutoReconfiguration facility can also be used to reconfigure an entire platform without specifying one or other targeted function. Only entities in need of configuration are reconfigured.

The Wildcarding capability allows a management application to perform a request on all or a set of entity instances of a specific class. Wildcarding can be applied to multi-instantiable entities only that are child entities within the FEP or BEP subsystem entity hierarchies. The wildcard character replaces an instance ID in a specific entity class. The SHOW_NEXT directive can be used to examine the attribute values of the next entity instance to the instance passed as input parameter. If required, the SHOW_NEXT_AND_RESET function can be used to reset the counters of the next entity instance.

For the design of the management structure of *IN7* an object-oriented director entity framework is used.

- **IN7 SNMP Agent**

  The *IN7* SNMP Agent enables a network management application that uses the Simple Network Management Protocol (SNMP) V1 to monitor *IN7* platforms and to receive selected *IN7* events reported through SNMP traps. The *IN7* MIB extension provides sets of tables to structure the information obtained from mapping *IN7* entity attributes to MIB objects. The *IN7* SNMP Agent can filter the traps reported and can be used to monitor more than one *IN7* platform simultaneously.

Application Programming Interfaces

Multiple Application Programming Interfaces (APIs) can be used at different levels of the SS7 protocol in the same application. This functionality allows applications to handle different types of Signalling System 7 messages.

The *IN7* INAP SRF API allows an application to open and close an INAP session with an SCF, to receive operations from the SCF, and to send the results to the SCF when an operation is completed. This API is available for the ITU-T protocol variant running on the *Tru64 UNIX* operating system only.

The *IN7* IS41-C API is available for the ANSI protocol variant on the *Tru64 UNIX*, and the *OpenVMS* operating systems only. This API allows TSPs to develop service applications for the following functional entities in the American cellular network:

- MSC representing the Mobile Switching Center
- HLR representing the Home Location Register
- VLR representing the Visitor Location Register
- EIR representing the Equipment Identity Register
- AC representing the Authentication Center
- MC representing the Message Center
- SME representing the Short Message Entity

The *IN7* TCAP API allows an application to open or close TCAP dialogues, to exchange components, and to handle special conditions that occur asynchronously during a dialogue. TCAP applications can use the ACF facility to provide failover for the services they play in the event of application copy failure. Applications can use the ACF API to save data associated with call contexts.

The *IN7* SCCP API allows both data and SCCP management requests or indications to be sent and received. SCCP applications can use the ACF facility if they also use a customized user distribution algorithm.

The *IN7* MTP API allows MTP messages to be sent and received. MTP applications can use the ACF facility if they also use a customized user distribution algorithm.

A single application process can access different APIs at the same time. A single application can play upto 32 Subsystem numbers (SSNs) on the same or different service levels and one Service Indicator (SI). An application can only play one SSN for an ITU-T TCAP level used by the INAP SRF level.

The procedures of the interfaces are mapped to the logical INAP, IS41-C, TCAP, SCCP, or MTP procedures and consist of a library of routines (requests and indications) linked to the application software.

Except for the INAP SRF and the IS41-C APIs, the *IN7* APIs are offered under the Microsoft Windows NT V4.0, the *Tru64 UNIX* V4.0F, and the *OpenVMS* V7.1 and V7.2 operating systems. They can be called using the C or C++ programming language under the Microsoft Windows NT, *Tru64 UNIX*, or the *OpenVMS* operating system.

Management Application Programming Interface

This interface allows a management application to access the internal functions of *IN7* to control and monitor them and allows the management of distributed configurations.

The Management API consists of a library of routines accessible under the Microsoft Windows NT V4.0, *Tru64 UNIX* V4.0F, or the *OpenVMS* V7.1 or V7.2 operating system. These can be called using the C or C++ programming language under the Microsoft Windows NT, *Tru64 UNIX*, or the *OpenVMS* operating system.

IN7 is shipped with a Graphical User Interface (GUI) that can configure, start, and monitor an *IN7* platform.

The Status Indication facility can be used to establish whether an *IN7* process, including any of the service application copy processes, or an ACF Server process is ready to receive commands from a management application. This part of the facility returns Process Status Indications (PSIs). The facility also returns Level Status Indications (LSIs) to indicate when there is a change in the status of the entities representing the API levels used by the service applications.

The *IN7* Management Toolkit consists of a library of routines that simplify the development of management applications. The routines consolidate the responses to a distributed request:

— Checking that there is no discrepancy between the responses to a distributed request

— Summing the counter values if the request is SHOW, SHOW_AND_RESET, SHOW_NEXT, or SHOW_NEXT_AND_RESET

— Returning a single consolidated response in a simple structure

The routines also make it easier to encode and decode the structures used in the Management API.

Generic User Part Application Programming Interface

The GUP API enables you to integrate the management of your application into the *IN7* management framework.

In this way, the same management application can manage both the *IN7* entities and private entities of the application with the same set of requests available at the Management API level.

SCCP Management Interface

Similar to the Management API, this interface is a set of routines allowing an application to send or receive SCCP management requests or indications, exchanged with the signalling network or remote network users. This interface is also available in the SCCP API.

The Global Title Translation functionality is managed exclusively through the *IN7* portable Management API. A specific set of routines allows a management application to define, modify, show, and test the translation rules.

User Distribution

If the default *IN7* message distribution mechanism for incoming messages does not select an application copy in an appropriate way for a particular application, it is possible to implement a customized mechanism instead. The default mechanism and various customized mechanisms can coexist on the same platform. Each application Subsystem Number (SSN) or Service Indicator (SI) can use a customized mechanism or the default mechanism.

IN7 provides User Distribution (UD) API routines for implementing user distribution algorithms.

MultiNetwork Platforms

One *IN7* installation can function as several separate Signalling Points in the same or different SS7 networks, provided that appropriate versions of the software are installed. (On Microsoft Windows NT systems both ANSI and ITU-T protocol variants are installed with the kit.) The type or types of protocol stack and the configuration of the *IN7* platform or platforms determine how an *IN7* installation functions in the SS7 networks to which it is linked. For example, a single *IN7* installation could function as:

- A Signalling Point in an ITU-T network and a Signalling Point in an ANSI network: both ITU-T and ANSI versions of the software are installed (coresident Signalling Points).
- A Signalling Point in an ANSI network, but with an ITU-T TCAP application: the ITU-T version of the TCAP level and the ANSI version of the Network Service Part (SCCP and MTP levels) are installed (mixed stack; applies also to ANSI TCAP over ITU-T Network Service Part).
- Two separate Signalling Points in the same (ANSI) network: each Signalling Point is identified by a different SS7 network address (Point Code). Only the ANSI version of the software needs to be installed or configured. This type of configuration (coresident Signalling Points connected to the same network) is also possible for the other protocol variants, such as ITU-T or CHINA (the CHINA protocol variant is not available on Microsoft Windows NT). This is the type of configuration used in verifying an installation with the Installation Verification Procedure (IVP) configured to run on two different platforms, as described in the *IN7 Installation Guide* for UNIX or for *OpenVMS Alpha* systems.

  When an *IN7* installation is configured in this way to have more than one *IN7* platform, the *IN7* kits installed must have the same version level. This requirement exists because some of the files, such as driver, firmware, and FailFast files, are common to each platform.

The *IN7 Technical Description* contains fuller information on the possible combinations of stack and platform configurations linked to SS7 networks conforming to the ITU-T or ANSI protocol variants.

Distributed Implementation

Both FEP and BEP functionality can run on the same machine, or machines can be dedicated to FEP or BEP functions. In the latter case, the machines are referred to as front-ends or back-ends respectively. In such a configuration the front-ends are dedicated to handling links, while applications run on the back-ends. The links of a linkset may be distributed across a number of processors that collectively have the same Signalling Point Code.

When there is more than one processor in an *IN7* configuration, the processors are linked by one Ethernet, Fast Ethernet, Memory channel, or FDDI LAN; if the *DECnet* transport is used, they can be linked by more than one Ethernet or FDDI LAN. The *DECnet* transport is available on the UNIX and the *OpenVMS* operating systems only. A given application, identified by a Subsystem Number, may have several copies running on the same or on different BEPs in a configuration.

Note: Compaq recommend that you have a dedicated LAN between BEP and FEP. If the Ethernet or FDDI link is not dedicated to *IN7* internal use, then you must make sure that this link is not loaded at maximum. For instance, on Ethernet do not exceed 30% load.

If TCP/IP is used as the transport protocol, you can also link an *IN7* platform to a TCP/IP network. In this case, the platform functions as a GDI Client or Server Site depending on its relationship with a given GDI Site in the TCP/IP network.

A machine hosting the ACF Server function can use the TCP/IP platform LAN as transport or a dedicated TCP/IP LAN (10M/bps or 100 M/bps). Compaq recommend use of a dedicated Ethernet 100 M/bps TCP/IP LAN. The ACF dedicated LAN can be any type of TCP/IP network, such as FDDI or token ring as well as Ethernet. The ACF facility has been tested with Ethernet 10 M/bps and 100 M/bps only.

Performance

IN7 V4.0 can handle throughput from hundreds to thousands of Message Signal Units per second depending on the configuration and the power of the machines configured. Full details on the performance of *IN7* are available from the *IN7* group, *AlphaServer* Systems in the Telecommunications Platform Division through your local Compaq office.

Clustering

An *IN7* V4.0 platform can be configured for operation on member nodes that also form part of a cluster as determined by the configuration of the operating system. Full details on clustering for *IN7* are available from the *IN7* group, *AlphaServer* Systems in the Telecommunications Platform Division through your local Compaq office.

Dimensioning

The sizing and configuring of an *IN7* platform depends on the number of links required, performance goals, availability requirements, and the size of the application. For more information, contact your local Compaq office.

STANDARDS

Table 2 contains the equivalent ITU-T, Telcordia (ex-Bellcore), ANSI and CHINA Recommendations for each of the SS7 protocols implemented in *IN7* V4.0. In compliance with the ITU-T Q.700 Recommendation, mapping of the SS7 stack has been attempted according to the Open System Interconnection (OSI) model.

For a full definition of compliance to standards consult the relevant statement of compliance document available from your local Compaq office.

Table 2
SS7 Standards Addressed by IN7 V4.0

OSI Layer	ITU-T	Telcordia (ex-Bellcore; based on GR-246-CORE)	ANSI	CHINA (based on GF001-9001[4])	SS7 Protocol
1 to 7	Q700			Q.700	SS7 Overview
7	ETSI ETS 300 374-1				INAP SRF
7			EIA/TIA IS-41.1-C		IS-41
7			EIA/TIA IS-41.2-C		IS-41
7			EIA/TIA IS-41.3-C		IS-41
7			EIA/TIA IS-41.4-C		IS-41
7			EIA/TIA IS-41.5-C		IS-41
7	Q.771	T1.114.1	T1.114.1	Q.771	TCAP
7	Q.772	T1.114.2	T1.114.2	Q.772	TCAP
7	Q.773	T1.114.3	T1.114.3	Q.773	TCAP
7	Q.774	T1.114.4	T1.114.4	Q.774	TCAP
7	Q.775			Q.775	TCAP
3	Q.711	T1.112.1	T1.112.1	Q.711	SCCP
3	Q.712	T1.112.2	T1.112.2	Q.712	SCCP
3	Q.713	T1.112.3	T1.112.3	Q.713	SCCP
3	Q.714	T1.112.4	T1.112.4	Q.714	SCCP
3	Q.716			Q.716	SCCP Performance
1 to 3	Q.701	T1.111.1	T1.111.1	Q.701	MTP Overview
1	Q.702	T1.111.2	T1.111.2	Q.702	MTP1
2	Q.703	T1.111.3	T1.111.3	Q.703	MTP2
3	Q.704	T1.111.4	T1.111.4	Q.704	MTP3
3	Q.707			Q.707	MTP3 On-Line Testing & Maintenance
1 to 3	Q.705	T1.111.5	T1.111.5	Q.705	Network Structure
1 to 3	Q.706	T1.111.6	T1.111.6	Q.706	MTP Performance
1 to 3			T1.111.7		MTP
1 to 3			T1.111.8		MTP

[4]The ITU-T recommendations are modified or supplemented for CHINA by the set of specifications contained in the technical specification document GF001-9001 issued by the Ministry of Posts and Telecommunications of the People's Republic of China. This protocol variant is not available on Microsoft Windows NT systems.

Table 2 (Cont.)
SS7 Standards Addressed by IN7 V4.0

OSI Layer	ITU-T	Telcordia (ex-Bellcore; based on GR-246-CORE)	ANSI	CHINA (based on GF001-9001[4])	SS7 Protocol
1 to 3	Q.780			Q.780	MTP Tests-Overview
2	Q.781			Q.781	MTP2 Tests
3	Q.782			Q.782	MTP3 Tests
1 to 3	Q.791			Q.791	MTP and SCCP Measurements

[4]The ITU-T recommendations are modified or supplemented for CHINA by the set of specifications contained in the technical specification document GF001-9001 issued by the Ministry of Posts and Telecommunications of the People's Republic of China. This protocol variant is not available on Microsoft Windows NT systems.

Table 3 maps the appropriate Telcordia (ex-Bellcore) standard for TCP/IP networks to the SS7 protocol level and the corresponding OSI layer.

Table 3
TCP/IP Standards Addressed by IN7 V4.0

OSI Layer	Telcordia (ex-Bellcore)	SS7 Protocol
7	ISCP Generic Data Interface (GDI) Specification for TCP/IP, SR-3389, TCP/IP Transport Protocol Specifications Version 5.0	TCAP

INSTALLATION

Compaq recommends that the customer's first purchase of this product includes Compaq Installation Services.

SUPPORTED HARDWARE

Combinations of hardware options are subject to limitations, such as bandwidth, physical configuration constraints, and electrical load and power supply.

Compaq reserves the right to change the number and type of devices supported by IN7. The minimum hardware requirements for future versions and updates of IN7 may be different from current requirements.

Hardware Requirements (Front-end)

The connectivity part of *IN7* is supported on *Alpha* system products from Compaq Computer Corporation and on INTEL-based PCs. For connectivity to the Signalling System 7 network, the *DNBE1*, *DNBT1*, or *DNBC4* Communications Controller is required.

The number of *DNBE1*, *DNBT1*, or *DNBC4* controllers depends on the number of PCI slots available on the machine.

Mixing *DNB*x1 and *DNBC4* devices on the same machine is not supported, but it is supported on different machines in the same platform.

If an *IN7* platform is configured to use the TCP/IP transport protocol and the TCP/IP management entities, the devices configured for connectivity to the TCP/IP network can be used through the *IN7* entity representing the network interface.

Processors Supported:

Alpha system products from Compaq:

AlphaServer 4000, 5/300, 5/300E, 5/400, 5/466, 5/533, 5/600

AlphaServer 4100, 5/300, 5/300E, 5/400, 5/466, 5/533, 5/600

AlphaServer 8200, 5/300, 5/350, 5/440, 5/625

AlphaServer 8400, 5/300, 5/350, 5/440, 5/625

Compaq AlphaServer DS10-EV6

Compaq AlphaServer DS20-EV6, DS20E-EV6

Compaq AlphaServer ES40-EV6

INTEL-based PCs:

All Intel-based ProLiant® Servers with PCI bus, starting from INTEL Pentium Pro™[5] CPU, 200 MHz.

[5]Pentium Pro™ is a trademark of Intel Corporation.

Hardware Requirements (Back-end)

Processors Supported:

Alpha system products from Compaq:

AlphaServer 4000, 5/300, 5/300E, 5/400, 5/466, 5/533, 5/600

AlphaServer 4100, 5/300, 5/300E, 5/400, 5/466, 5/533, 5/600

AlphaServer 8200, 5/300, 5/350, 5/440, 5/625

AlphaServer 8400, 5/300, 5/350, 5/440, 5/625

Compaq AlphaServer DS10-EV6

Compaq AlphaServer DS20-EV6, DS20E-EV6

Compaq AlphaServer ES40-EV6

INTEL-based PCs:

All Intel-based ProLiant® Servers with PCI bus, starting from INTEL Pentium Pro™[5] CPU, 200 MHz.

MEMORY REQUIREMENTS

IN7 requires the following memory size per machine in one *IN7* platform, depending on the operating system and the size and type of platform configuration. The size of configuration is graded as follows:

- **Small**: 64 destinations
- **Medium**: 512 destinations
- **Large**: 1024 destinations

Table 4
Microsoft Windows NT Systems

Size	FEP	BEP	GUI Client
Small	64 Mb	128 Mb	64 Mb
Medium	64 Mb	256 Mb	N/A *
Large	64 Mb	512 Mb	N/A *

Table 5
Compaq Tru64 UNIX Systems

Size	FEP	BEP	GUI Client
Small	64 Mb	128 Mb	64 Mb
Medium	64 Mb	256 Mb	N/A *
Large	128 Mb	384 Mb	N/A *

Table 6
OpenVMS Systems

Size	FEP	BEP	GUI Client
Small	64 Mb	64 Mb	64 Mb
Medium	64 Mb	128 Mb	256 Mb
Large	N/A *	N/A *	N/A *

N/A * indicates that this is not supported in IN7 Version 4.0.

The figures for the BEP function apply to machines hosting the following processes:

- BEP
- FailFast
- DIR
- S7MP

- GUI Server and GUI Dispatcher when monitoring the platform

SPECIAL HARDWARE REQUIREMENTS

For questions about hardware requirements for special configurations, please contact the engineering group or product management, both in the *IN7* group, *AlphaServer* Systems in the Telecommunications Platform Division, contactable through your local Compaq office.

OPTIONAL HARDWARE

The following options can be installed on the *Tru64 UNIX* and the *OpenVMS* operating systems:

- A second Ethernet or Fast Ethernet interface and cable
- An FDDI interface with one or two attachments
- A second Memory channel interface and cables

SOFTWARE REQUIREMENTS

IN7 Front-End Process:

— Microsoft Windows NT Operating System Version 4.0, Server, and NT Service Pack 5, or

— *Tru64 UNIX* operating system Version 4.0F and Patch BL13 for *Tru64 UNIX* V4.0F, or

— *OpenVMS Alpha* Operating System Version 7.1 or 7.2-1

— TCP/IP networking must be installed and configured on Microsoft Windows NT systems, or

— *DECnet/OSI* transport protocol Version 4.0-2 or later for *Tru64 UNIX* V4.0F *Alpha* Systems, if chosen as the internal *IN7* transport, or

— *DECnet-Plus* transport protocol Version 7.1 or Version 7.2 for *OpenVMS Alpha* Systems

— WANDD Version 3.0-4 or later for *Tru64 UNIX Alpha* Systems, included in the product X.25 Version 2.0 for DEC OSF/1 Systems

— JAVA Runtime Environment: JRE Version 1.1.8

IN7 Back-End Process

— Microsoft Windows NT Operating System Version 4.0, Server, and NT Service Pack 5, or

— *Tru64 UNIX* Operating System Version 4.0F and Patch BL13 for *Tru64 UNIX* V4.0F, or

— *OpenVMS Alpha* Operating System Version 7.1 or 7.2-1

— TCP/IP networking must be installed and configured on Microsoft Windows NT systems, or

— *DECnet/OSI* transport protocol Version 4.0-2 or later for *Tru64 UNIX* V4.0F *Alpha* Systems, if chosen as the internal *IN7* transport, or

— *DECnet-Plus* transport protocol Version 7.1 or Version 7.2 for *OpenVMS Alpha* Systems.

— JAVA Runtime Environment: JRE Version 1.1.8

IN7 SNMP Agent process on OpenVMS systems

— *OpenVMS Alpha* Operating System Version 7.1 or 7.2-1

— *TCP/IP Services for OpenVMS Alpha* systems Version V5.0A - ECO 1
on the Director machine where the Agent is installed and on the machine where the SNMP Manager runs.

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

YEAR 2000 READY

This product is Year 2000 Ready.

"Year 2000 Ready" products are defined by Compaq as products capable of accurately processing, providing, and/or receiving date data from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000, including leap year calculations, when used in accordance with the associated Compaq product documentation and provided that all hardware, firmware, and software used in combination with such Compaq products properly exchange accurate date data with the Compaq products.

To ensure that this product is Year 2000 Ready, the following testing process/methods were utilized:

Code Analysis

To ensure that this product interoperates properly with other hardware and software, the following testing process/methods were utilized:

System Testing

For further details of the analysis and test reports, contact the Quality Manager in the *IN7* group, *AlphaServer* Systems in the Telecommunications Platform Division through your local Compaq office.

SOFTWARE WARRANTY

This software is provided by Compaq with a 90 day conformance warranty in accordance with the warranty terms applicable to the license purchase.

ORDERING IN7

Software media and documentation are distributed directly by the engineering team in the *IN7* group, *AlphaServer* Systems in the Telecommunications Platform Division, contactable through your local Compaq office, which sends an internal mail to:

ss7_support@compaq.com

containing the following information:

- The item required:
  - — SW kit
  - — Documentation kit
- The version required:
  - — V4.0
- The protocol variant required:
  - — ANSI for the North American market
  - — ITU-T for the European and Asian markets
  - — CHINA for China
- The platform required:
  - — Microsoft Windows NT INTEL-based PC systems
  - — *Tru64 UNIX Alpha* systems
  - — *OpenVMS Alpha* systems

SOFTWARE LICENSING

FLEX*lm* is used to handle licensing.

There are *IN7* licenses for FEPs and BEPs. Licensing for the core product is granted through tokens for the total number of links to the SS7 network and for the total number of connections to the GDI TCP/IP network on each FEP.

On the BEPs, a single-machine architecture requires a BEP Lite license and a replicated monolithic or a distributed architecture requires a BEP license for each CPU that hosts the service application function.

An *IN7* FEP license allows connection to the physical links of the external network.

An *IN7* BEP license allows access to the *IN7* service APIs. These licenses are for both ANSI and ITU-T stacks.

You must also purchase the appropriate license options if you want to use the following APIs:

- IS41-C using ANSI TCAP on *Tru64 UNIX* and *OpenVMS* operating systems
- INAP SRF using ITU-T TCAP on the *Tru64 UNIX* operating system

For a mixed stack, only one license is payable, although *IN7* kits for different protocol variants must be installed.

The FEP and BEP can run on the same machine or be distributed and combined over several machines, still representing one single Point Code, for software and hardware fault tolerance.

If the FEP and BEP are on the same machine, and only one machine is present in the system, a special package, called a Lite configuration, can be introduced to promote entry-level solutions. This type of configuration cannot be ugraded.

If the FEP and BEP are on the same machine and your *IN7* installation consists of more than one machine, the BEP license is applicable. This type of license can be upgraded. You can obtain additional licenses for this replicated monolithic architecture when you add more combined FEP and BEP machines to your configuration. You can also add additional FEP machines with the appropriate FEP licenses.

For *IN7* platforms that consist of more than one machine, typically where the FEPs and the BEPs are installed on different machines, a BEP license is also applicable. This type of license allows you to upgrade the distributed architecture of your *IN7* installation.

The number of tokens that you own limits the use of your platforms. You should therefore calculate the number of tokens you need according to the *maximum* number of active CPUs, links and trunks that your platform will use. Discuss your needs with your Compaq Representative.

This software is furnished under the licensing provisions of Compaq Computer Corporation's Standard Terms and Conditions. For more information about the licensing terms and policies of Compaq, contact your local Compaq office.

IN7 V4.0

Licenses Available - Microsoft Windows NT systems

Back-End	BEP, platform with more than one machine:
	QM-69XAA-AA IN7 BEP NTI 1 CPU LIC
Back-End	BEP Lite, single-machine platform:
	QM-69VAA-AA IN7 BEPL NTI 1 CPU LIC
Front-End:	
Trunk	QM-6KCAA-AA IN7 FEP-TRK NTI 1 USE LIC V4
1 link	QM-6A1AA-AA IN7 FEP NTI 1 USE LIC
2 links	QM-6A1AA-AB IN7 FEP NTI 2 USE LIC
4 links	QM-6A1AA-AC IN7 FEP NTI 4 USE LIC
8 links	QM-6A1AA-AD IN7 FEP NTI 8 USE LIC
16 links	QM-6A1AA-AE IN7 FEP NTI 16 USE LIC
24 links	QM-6A1AA-AF IN7 FEP NTI 24 USE LIC
32 links	QM-6A1AA-AG IN7 FEP NTI 32 USE LIC
64 links	QM-6A1AA-AH IN7 FEP NTI 64 USE LIC V4
128 links	QM-6A1AA-AJ IN7 FEP NTI 128 USE LIC V4

IN7 V4.0

Licenses Available - *UNIX Alpha* **systems**

Back-End	BEP, platform with more than one machine:
	QM-69XAC-AA IN7 BEP U/A 1 CPU LIC V4
Back-End	BEP Lite, single-machine platform:
	QM-69VAC-AA IN7 BEPL U/A 1 CPU LIC V4
INAP SRF	option:
	QM-5SGAC-AA IN7 INAP U/A 1 CPU LIC V4
IS41-C	option:
	QM-667AC-AA IN7 IS41 U/A 1 CPU LIC V4

Front-End:

Trunk	QM-6KCAC-AA IN7 FEP-TRK U/A 1 USE LIC V4
1 link	QM-6A1AC-AA IN7 FEP U/A 1 USE LIC V4
2 links	QM-6A1AC-AB IN7 FEP U/A 2 USE LIC V4
4 links	QM-6A1AC-AC IN7 FEP U/A 4 USE LIC V4
8 links	QM-6A1AC-AD IN7 FEP U/A 8 USE LIC V4
16 links	QM-6A1AC-AE IN7 FEP U/A 16 USE LIC V4
24 links	QM-6A1AC-AF IN7 FEP U/A 24 USE LIC V4
32 links	QM-6A1AC-AG IN7 FEP U/A 32 USE LIC V4
64 links	QM-6A1AC-AH IN7 FEP U/A 64 USE LIC V4
128 links	QM-6A1AC-AJ IN7 FEP U/A 128 USE LIC V4

IN7 V4.0

Licenses Available - *OpenVMS Alpha* **systems**

Back-End BEP, platform with more than one machine:

QM-69XAB-AA IN7 BEP V/A 1 CPU LIC V4

Back-End BEP Lite, single-machine platform:

QM-69VAB-AA IN7 BEPL V/A 1 CPU LIC V4

IS41-C option:

QM-667AB-AA IN7 IS41 V/A 1 CPU LIC V4

Front-End:

Trunk	QM-6KCAB-AA IN7 FEP-TRK V/A 1 USE LIC V4
1 link	QM-6A1AB-AA IN7 FEP V/A 1 USE LIC V4
2 links	QM-6A1AB-AB IN7 FEP V/A 2 USE LIC V4
4 links	QM-6A1AB-AC IN7 FEP V/A 4 USE LIC V4
8 links	QM-6A1AB-AD IN7 FEP V/A 8 USE LIC V4
16 links	QM-6A1AB-AE IN7 FEP V/A 16 USE LIC V4
24 links	QM-6A1AB-AF IN7 FEP V/A 24 USE LIC V4
32 links	QM-6A1AB-AG IN7 FEP V/A 32 USE LIC V4
64 links	QM-6A1AB-AH IN7 FEP V/A 64 USE LIC V4
128 links	QM-6A1AB-AJ IN7 FEP V/A 128 USE LIC V4

Note: The part numbers shown are valid at time of release. Please contact your local Compaq office for the most up-to-date information.

To use *IN7* you must have the appropriate licenses.

The license file is located in:

```
%IN7kit%\licenses\license.dat
```

on Microsoft Windows NT systems; %IN7kit% denotes the directory where you install *IN7*

```
/usr/var/ss7/licenses/license.dat
```

on UNIX *Alpha* systems

```
SYS$STARTUP:license_in7.dat
```

on *OpenVMS Alpha* systems

OpenVMS Tailoring

For *OpenVMS*, the following *OpenVMS* classes are required for full functionality of this layered product:

- *OpenVMS* Required Saveset
- Network Support
- Secure User's Environment
- Utilities

SOFTWARE PRODUCT SERVICES

Consulting and training services relating to this product, and services for implementing particular customer-specific variants to the standard product are available.

A variety of service options are available from Compaq. For more information, contact your local Compaq office or look up the *IN7* web site at:
www.compaq.com/products/software/in7/.

The above information is valid at the time of release. Please contact your local Compaq office for the most up-to-date information.