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**Intelligent transport systems —  
Communication access for land mobiles  
(CALM) — Non-IP networking —**

**Part 1:  
Fast networking & transport layer  
protocol (FNTP)**

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*Systemes intelligents de transport — Accès aux communications des  
services mobiles terrestres (CALM) — Réseautique non-IP —*

*Partie 1: Réseautique rapide et protocole de la couche transport*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents)

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This first edition of ISO 29281-1, together with ISO 29281-2, cancels and replaces ISO 29281:2011.

ISO 29281 consists of the following parts, under the general title *Intelligent transport systems — Communication access for land mobiles (CALM) — Non-IP networking*:

- *Part 1: Fast networking and transport layer protocol (FNTP)*
- *Part 2: Legacy system support*

## Introduction

This part of ISO 29281 is part of a series of International Standards for communications access for land mobiles (CALM). An introduction to the whole set of International Standards is provided in ISO 21217.

This part of ISO 29281 is part 1 of a multipart standard which determines the intelligent transport systems (ITS) non-IP communications.

An essential protocol for non-IP communications is the “Fast networking & transport layer protocol” (FNTP). FNTP distinguishes:

- a basic port mapper protocol, primarily used for single-hop communications between ITS stations;
- protocol extensions for
  - N-hop groupcast;
  - LPP;
  - secured communication;
  - ITS station-internal forwarding of packets between ITS-S host ITS-SCUs and ITS-S router ITS-SCUs.

FNTP is validated in the CVIS project.

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# Intelligent transport systems — Communication access for land mobiles (CALM) — Non-IP networking —

## Part 1: Fast networking & transport layer protocol (FNTP)

### 1 Scope

This part of ISO 29281 specifies a protocol of the ITS-S networking and transport layer in support of efficient ad hoc single-hop communications with optional N-hop broadcast.

This protocol supports ITS station-internal forwarding of packets, i.e. between ITS-S routers and ITS-S hosts and vice versa. The protocol is named “Fast Networking & Transport Protocol” (FNTP).

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8825-2, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER) — Part 2*

ISO 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO 21218, *Intelligent transport systems — Communications access for land mobiles (CALM) — Access technology support*

ISO 24102-1, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 1: Local management*

ISO 24102-3, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 3: Service access points*

ISO 24102-4, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 4: Station-internal management communications*

ISO 24102-5, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 5: Fast service advertisement protocol (FSAP)*

ETSI TS 102 985-1, *Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 1: Protocol implementation conformance “statement (PICS) proforma*

ETSI TS 102 985-2, *Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 2: Test suite structure & test purposes (TSS&TP)*

ETSI TS 102 985-3, *Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 3: Abstract test suite and partial PIXIT (ATS) specification*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217, ISO 24102-3, ISO 24102-4 and the following apply.

#### 3.1

##### ITS-S port

source and/or destination “endpoint” for communications identified by an integer number

### 4 Abbreviated terms

FNTP Fast networking & transport protocol

ITS-SP ITS-S port

### 5 Architectures

#### 5.1 Modes of operation

##### 5.1.1 General context and purpose of FNTP

The “fast networking & transport layer protocol” (FNTP) specified in this part of ISO 29281 is designed as a protocol of the ITS-S networking and transport layer of the ITS station (ITS-S) architecture which recognizes the concepts of the bounded, secured and managed ITS-S; and supports the concept of ITS station communication units (ITS-SCU) to implement roles of an ITS-S in physical units specified (see ISO 21217, ISO 24102-1, ISO 24102-3 and ISO 24102-4).

FNTP is primarily designed to enable single-hop communication between peer ITS stations with minimum protocol overhead, and supports optional features.

NOTE ISO 15628 legacy systems support specified in [2] makes use of FNTP.

FNTP supports any kind of ad hoc access technology, e.g. CALM M5, CALM IR. FNTP may be used to connect source and destination “endpoints” identified by “ITS-S port” (ITS-SP) numbers in peer ITS stations, where peer ITS stations are uniquely identified by a Link-ID (usually MAC address contained in it) of the access layer specified in ISO 21218. Consequently, FNTP is a port mapper protocol, usually located in the transport layer of the OSI model.

##### 5.1.2 Basic mode of operation

The basic mode of operation is the simplest option of FNTP, which is just providing single-hop communications between instances of ITS stations without applying any of the options of FNTP.

##### 5.1.3 Extended mode of operation

The extended mode of operation supports options of the FNTP, e.g.:

- ITS station-internal forwarding;
- secure communications;
- N-hop broadcast;
- LPP support;
- CIP management.



ITS station-internal forwarding is a special option referred to as “station-internal forwarding mode of operation”.

Other options may be added in a future revision of this part of ISO 29281.

## 5.2 FNTF reference architecture

Figure 1 illustrates the location of FNTF in the ITS station (ITS-S) specified in ISO 21217, and the communication relations with other protocol entities.

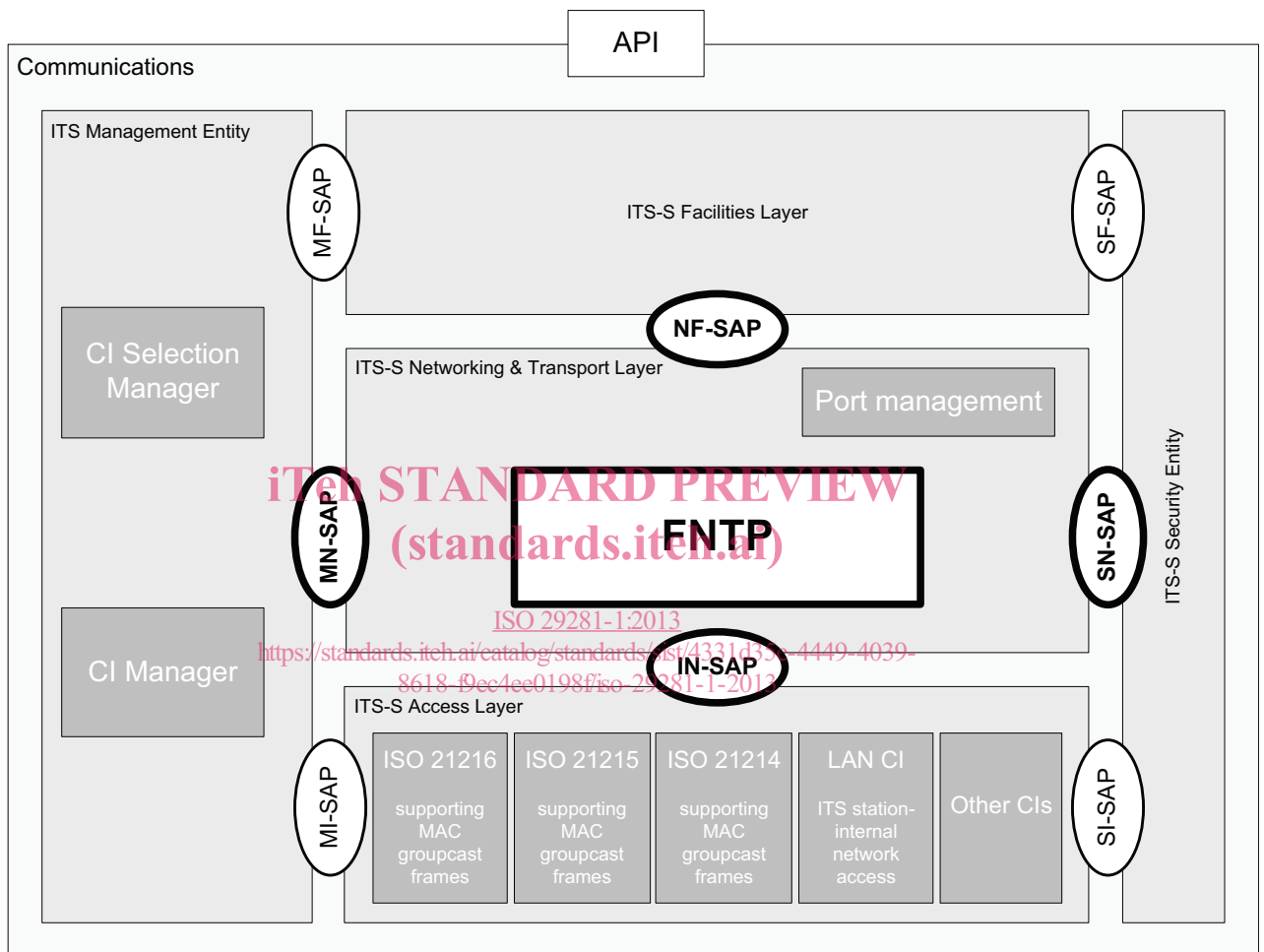


Figure 1 — FNTF reference architecture

The “Port management” is specified as part of FNTF, but may also be used for other ITS-S networking and transport layer protocols.

The “CI Selection Manager” is specified in ISO 24102-1. The “CI Manager” is specified in ISO 24102-1 and ISO 21218. These two managers are supporting FNTF, but FNTF does not necessarily depend on these managers.

## 5.3 Communication principles

### 5.3.1 Transmission

Transmission requests may be presented by the ITS-S facilities layer via the NF-SAP. Sources and destinations of messages in the ITS-S facilities layer are identified by ITS-SP numbers.

Valid transmission requests to a groupcast MAC address are given by a “well-known” destination port address in combination with an existing groupcast VCI. The value of the source port address is irrelevant with respect of validity of a transmission request in case no reply is expected. Replies to groupcast messages are expected, e.g. in case of the service advertisement message specified in ISO 24102-5.

Valid transmission requests to a unicast MAC address are given by any valid destination port address in combination with an existing unicast VCI. The value of the source port address is irrelevant with respect of validity of a transmission request in case no reply is expected.

Transmission requests are presented by the FNTF to the ITS-S access layer using services of the IN-SAP.

NOTE In a CALM compliant ITS station, assignment of VCIs to ITS-S applications is done automatically by the CI selection management specified in ISO 24102-1.

5.3.2 Reception

Reception notifications may be presented by the ITS-S access layer to the FNTF using services of the IN-SAP. Sources and destinations of messages are identified by ITS-SP numbers contained in the FNTF NPDU.

Valid notified packets addressed to an ITS-SP are given by a known destination port address. Which CI was used for reception of the packet, and which is the source port address of the packet, are not relevant for the validity of the packet, but are relevant for a potential reply.

Notifications of received packets are presented by the FNTF to the ITS-S facilities layer using services of the NF-SAP.

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5.3.3 FNTF ITS-SPs

Allocation and deletion of dynamic and static well-known “ITS-S port” (ITS-SP) numbers is specified in 8.2.

NOTE Static well-known ITS-SP numbers are assigned to ITS applications by a registration authority, see [4].

5.4 Implementation architectures

FNTF may support the implementation architectures introduced in ISO 21217 and illustrated in Figures 2, 3 and 4 with the peer ITS stations A and B, indicating FNTF in the ITS-S networking and transport layer.

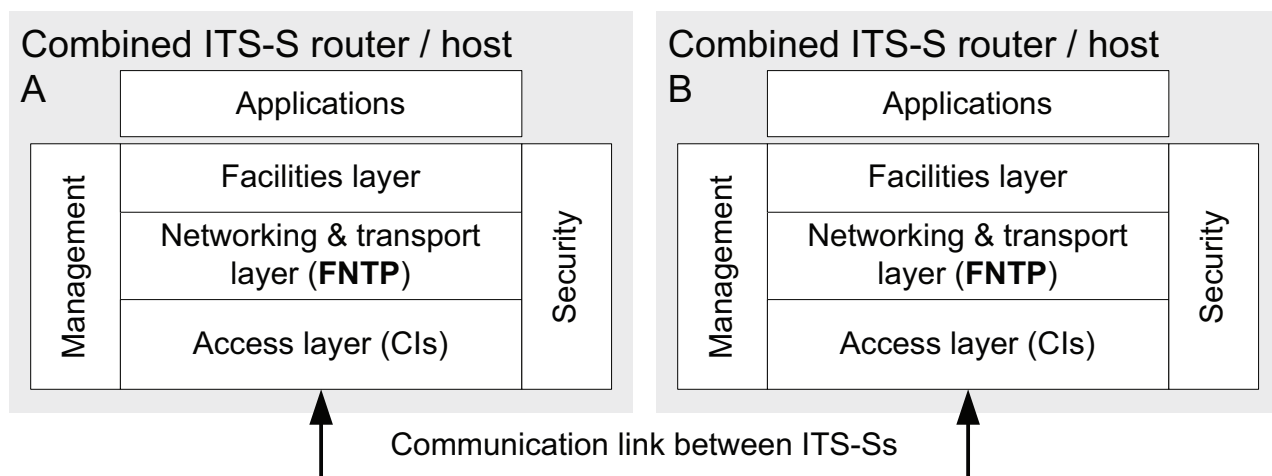


Figure 2 — Implementation architecture I

In case the FNTF is implemented in an ITS-SCU which does not have both roles of ITS-S host and ITS-S router, the ITS station-internal network shall be supported. This situation is illustrated in Figures 3 and 4.

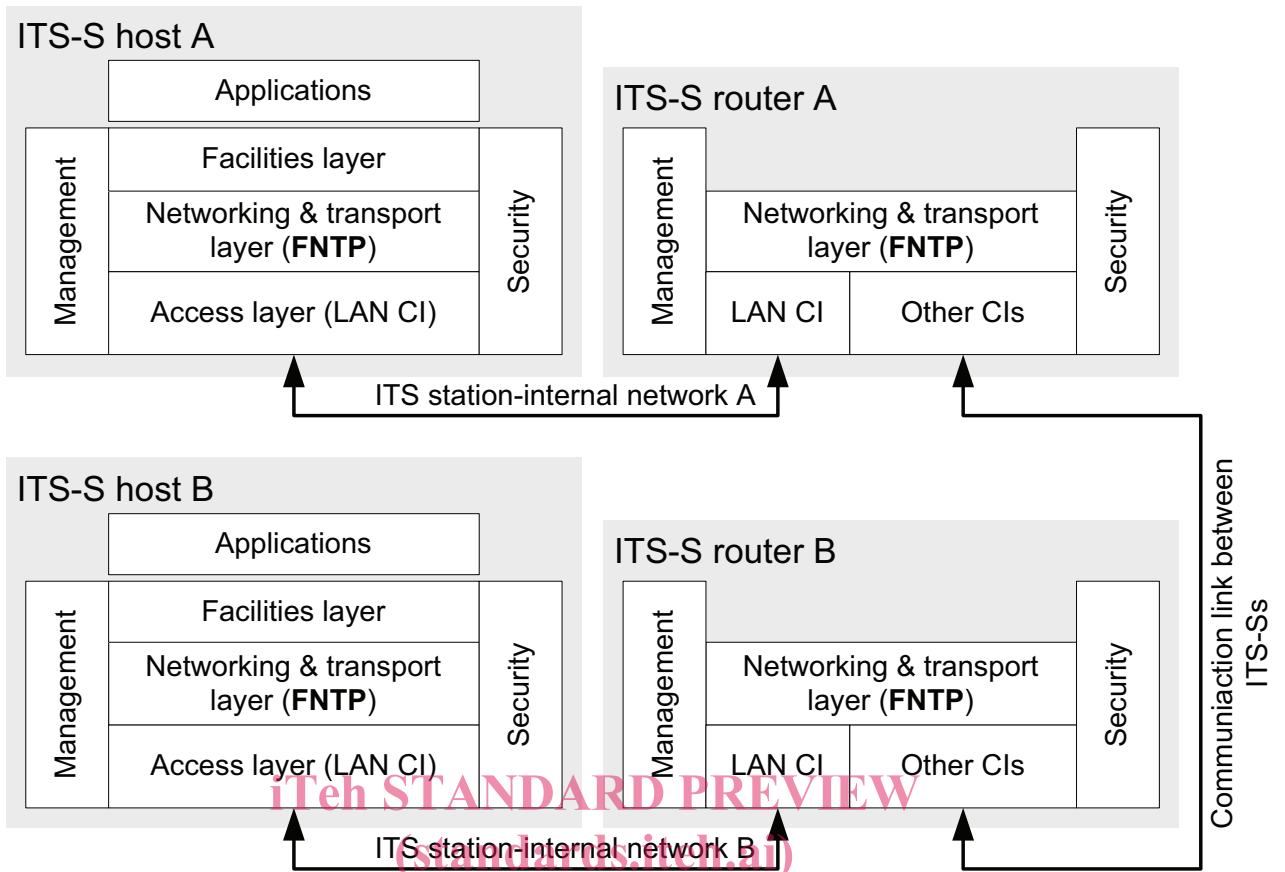


Figure 3 — Implementation architecture II

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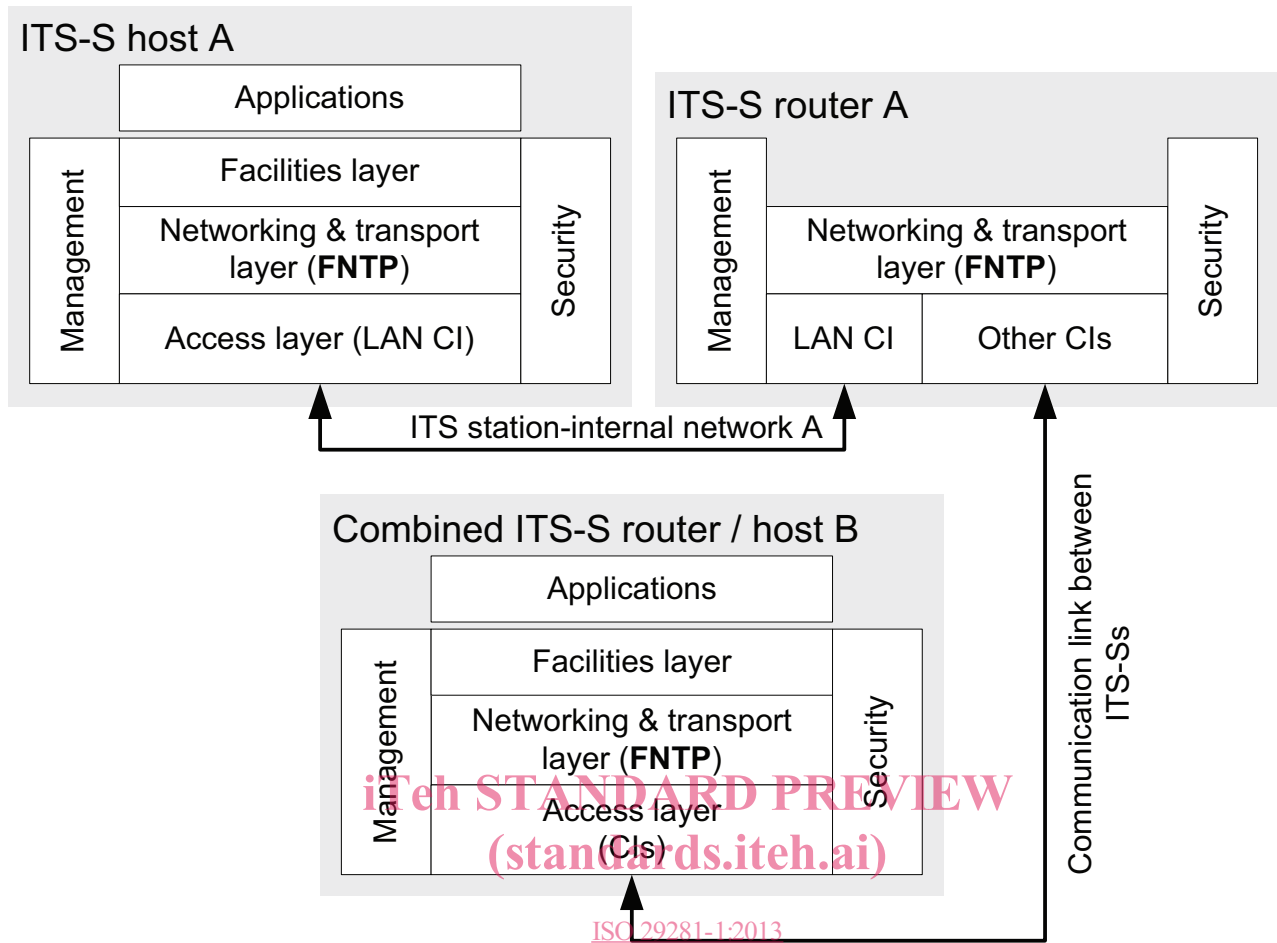


Figure 4 — Implementation architecture III

## 6 Protocol elements

### 6.1 Service access points

#### 6.1.1 IN-SAP

The FNTP shall support IN-SAP functionality as specified in ISO 21218.

The FNTP is identified in the IN-SAP with the appropriate SAP address “fast communication without IPv6 addresses” as specified in ISO 21218. Only the even value of the two possible address values shall be applied for FNTP, as FNTP does not distinguish commands and responses.

NOTE An EtherType value for the FNTP [3] might be allocated to be used in MAC frames. However, this is outside the scope of this part of ISO 29281.

#### 6.1.2 NF-SAP

The FNTP shall support NF-SAP functionality with details specified in this part of ISO 29281.

#### 6.1.3 MN-SAP

The FNTP shall support MN-SAP functionality identified in this part of ISO 29281 and specified in ISO 24102-3.