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Road vehicles — Media Oriented Systems Transport (MOST) —

Part 14: Lean application layer

Véhicules routiers — Système de transport axé sur les médias —

Partie 14: Couche d'application allégée

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Foreword

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

A list of all parts in the ISO 21806 series can be found on the ISO website.

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Introduction

The Media Oriented Systems Transport (MOST) communication technology was initially developed at the end of the 1990s in order to support complex audio applications in cars. The MOST Cooperation was founded in 1998 with the goal to develop and enable the technology for the automotive industry. Today, MOST[1)] enables the transport of high quality of service (QoS) audio and video together with packet data and real-time control to support modern automotive multimedia and similar applications. MOST is a function-oriented communication technology to network a variety of multimedia devices comprising one or more MOST nodes.

Figure 1 shows a MOST network example.

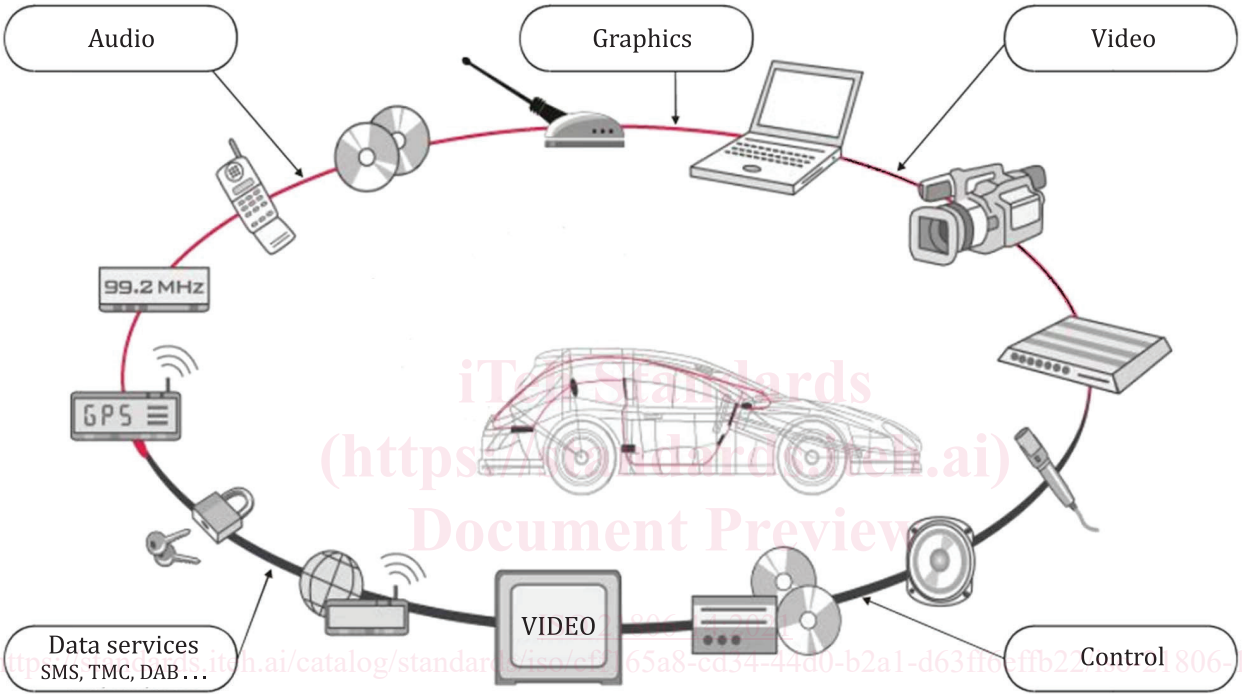

Figure 1 — MOST network example

The MOST communication technology provides:

— synchronous and isochronous streaming,

— small overhead for administrative communication control,

— a functional and hierarchical system model,

— API standardization through a function block (FBlock) framework,

— free partitioning of functionality to real devices,

— service discovery and notification, and

— flexibly scalable automotive-ready Ethernet communication according to ISO/IEC/IEEE 8802-3[2].

MOST is a synchronous time-division-multiplexing (TDM) network that transports different data types on separate channels at low latency. MOST supports different bit rates and physical layers. The network clock is provided with a continuous data signal.

1) MOST® is the registered trademark of Microchip Technology Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO.

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Within the synchronous base data signal, the content of multiple streaming connections and control data is transported. For streaming data connections, bandwidth is reserved to avoid interruptions, collisions, or delays in the transport of the data stream.

MOST specifies mechanisms for sending anisochronous, packet-based data in addition to control data and streaming data. The transmission of packet-based data is separated from the transmission of control data and streaming data. None of them interfere with each other.

A MOST network consists of devices that are connected to one common control channel and packet channel.

In summary, MOST is a network that has mechanisms to transport the various signals and data streams that occur in multimedia and infotainment systems.

The ISO standards maintenance portal (https://standards.iso.org/iso/) provides references to MOST specifications implemented in today's road vehicles because easy access via hyperlinks to these specifications is necessary. It references documents that are normative or informative for the MOST versions 4V0, 3V1, 3V0, and 2V5.

The ISO 21806 series has been established in order to specify requirements and recommendations for implementing the MOST communication technology into multimedia devices and to provide conformance test plans for implementing related test tools and test procedures.

To achieve this, the ISO 21806 series is based on the open systems interconnection (OSI) basic reference model in accordance with ISO/IEC 7498-1[1] and ISO/IEC 10731,[3] which structures communication systems into seven layers as shown in Figure 2. Stream transmission applications use a direct stream data interface (transparent) to the data link layer.

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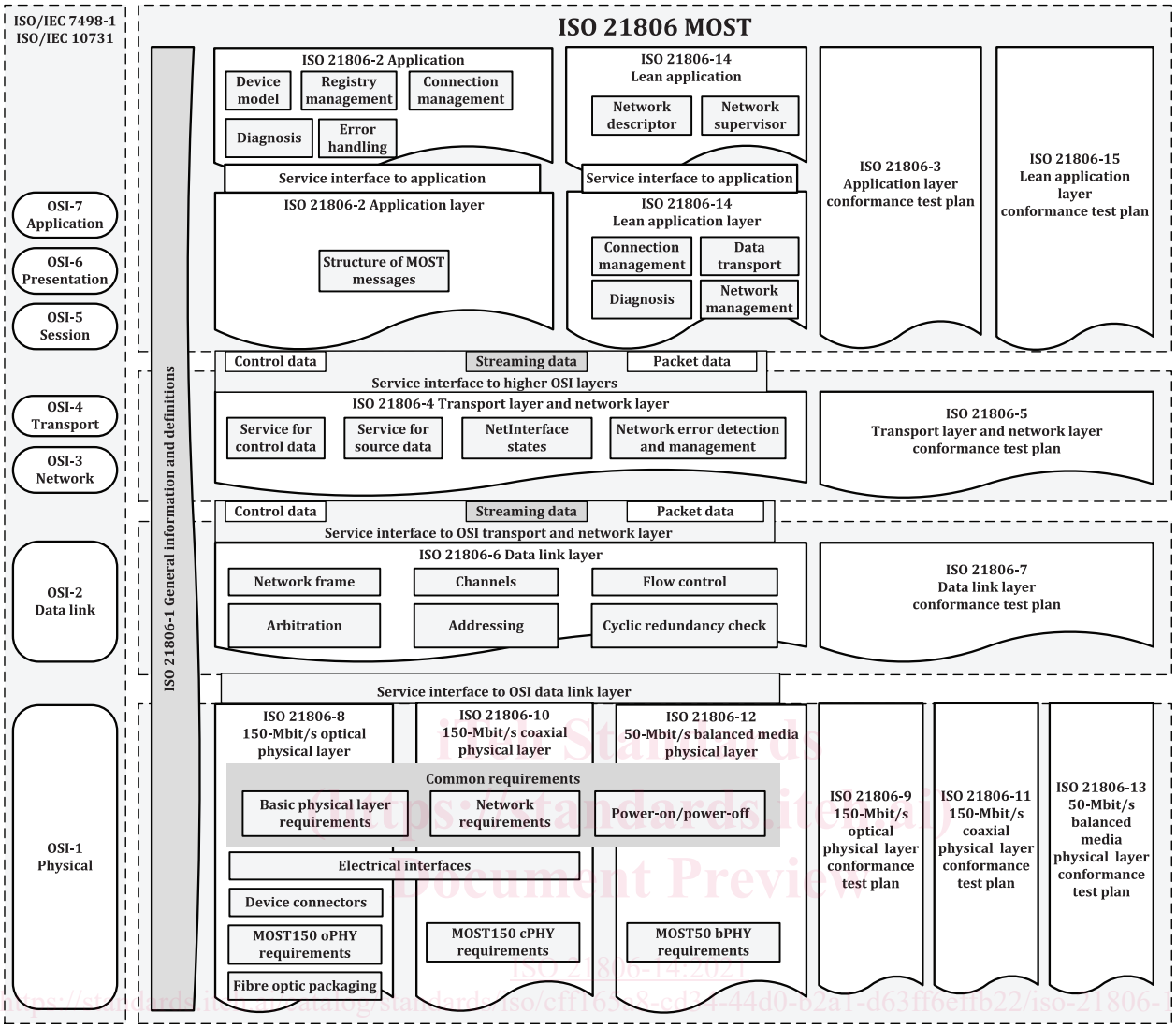

Figure 2 — The ISO 21806 series reference according to the OSI model

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Road vehicles — Media Oriented Systems Transport (MOST) —

Part 14: Lean application layer

1 Scope

This document specifies the technical requirements for the lean application layer for MOST, a synchronous time-division-multiplexing network.

The lean application layer includes a specification of the services available to control the configuration and behaviour of the network management.

The lean application layer covers the definition of:

— node kinds,

— node addressing,

— data transport,

— network configuration,

— lean network services interface,

— network management, including connection management,

— diagnosis, and

— timing definitions.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 21806-1, *Road vehicles — Media Oriented Systems Transport (MOST) — Part 1: General information and definitions*

ISO 21806-4, *Road vehicles — Media Oriented Systems Transport (MOST) — Part 4: Transport layer and network layer*

ISO 21806-10, *Road vehicles — Media Oriented Systems Transport (MOST) — Part 10: 150-Mbit/s coaxial physical layer*

ISO 21806-12, *Road vehicles — Media Oriented Systems Transport (MOST) — Part 12: 50-Mbit/s balanced media physical layer*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21806-1 and the following apply.

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ISO and IEC maintain terminological databases for use in standardisation at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
coupling
tie between a streaming *socket* (3.11) and a network socket

3.2
lean network service
implementation of a software library that provides mechanisms to support *node discovery* (3.6) and establish a *network configuration* (3.3)

3.3
network configuration
nodes currently connected to the network and *paths* (3.7) established for transmission

3.4
network descriptor
list of nodes allowed to participate in network communication, including valid *paths* (3.7) with definition of *couplings* (3.1) and streaming connections

3.5
network supervisor
entity that is responsible for monitoring the *network configuration* (3.3)

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3.6
node discovery
determination of the presence of the expected *remote nodes* (3.8)

3.7
path
two *couplings* (3.1) and a streaming connection

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3.8
remote node
node that participates in a MOST network that conforms to this document and does not implement the *lean network services* (3.2)

3.9
root node
node in a MOST network that controls the network (discover, configure, and connect)

3.10
signature
unique identification of a node

Note 1 to entry: The signature includes the logical node address, DiagID, MAC address, etc. It is provided at design time. The signature is matched against the information contained in the *network descriptor* (3.4).

3.11
socket
interface of the MNC

Note 1 to entry: A socket is either a streaming socket or a network socket.

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3.12
source drop
detection of unavailability of a streaming connection by a sink

Note 1 to entry: This could, for example, be caused by network or source malfunction.

4 Symbols and abbreviated terms

4.1 Symbols

--- empty table cell or feature undefined

4.2 Abbreviated terms

LNSI lean network services interface

NSAI network supervisor/application interface

5 Conventions

This document is based on OSI service conventions as specified in ISO/IEC 10731[2].

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6 Basic principles

The MOST network consists of nodes. The node that provides the network clock and is responsible for startup and shutdown of the network, as well as network management is called root node. The other nodes that participate in the network communication are called remote nodes.

Figure 3 shows the MOST network example.

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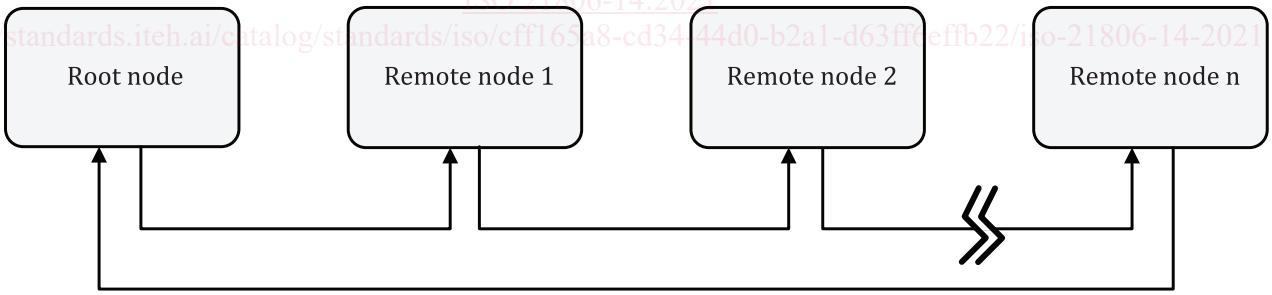

Figure 3 — MOST network example

Network management includes the process for startup and shutdown of the network.

Node discovery is a network management process that identifies all nodes in the network, which present a unique signature to the root node. Node discovery determines the presence of the expected remote nodes.

The nodes that currently exist in the network and the streaming connections between those nodes are called network configuration. The network supervisor in the root node is responsible for monitoring the network configuration.

The lean network services implement a software library that provides the root node with mechanisms for node discovery and establishing a network configuration. A remote node reacts to any lean network services request, for example, it answers to `Hello_Get` commands.

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The connection management, as part of the lean network services, is a process that establishes paths, couplings, connections, and sockets based on the network descriptor.

7 Node kinds

7.1 General

REQ	7.1 AL – Root node and remote nodes
There shall be one root node and up to 63 remote nodes.	

The maximum number of nodes may be further reduced by physical layer restrictions.

7.2 Root node

7.2.1 General

The root node in a MOST network controls the network (discover, configure, and connect). This node is the one that implements the mandatory network supervisor.

REQ	7.2 AL – Root node is TimingMaster
The root node shall be the TimingMaster.	

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REQ	7.3 AL – Root node structure
The root node shall contain: — the network supervisor, and — the lean network services.	

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Figure 4 shows the root node. The application consists of software and/or hardware. It uses the network supervisor/application interface (NSAI) to communicate with the network supervisor. The application exchanges streaming data and packet data with the MNC.

The network supervisor uses the network descriptor to configure the lean network services by means of the lean network services interface (LNSI). The LNSI, in one direction, transports requests from the network supervisor to the lean network services and, in the opposite direction, provides responses to the network supervisor.

The lean network services exchange network management messages with the MNC. The lean network services send commands to and receive reports from the MNC.

The MNC of the root node is the TimingMaster of the MOST network.

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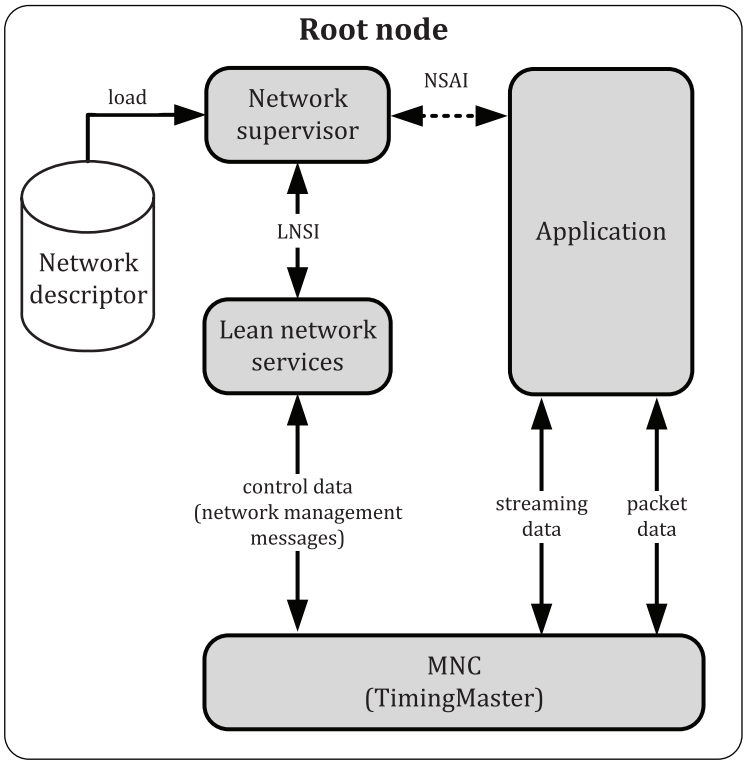

Figure 4 — Root node

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7.2.2 Lean network services

The lean network services are implemented in the root node, exclusively.

REQ	7.4 AL – Lean network services scope
The lean network services shall implement: — startup; — shutdown; — node discovery; — connection management; and — diagnostic functions.	

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7.2.3 Network descriptor

REQ	7.5 AL – Network descriptor
The network descriptor shall contain the definition of: — nodes allowed to participate in network communication; — valid paths; — couplings; — streaming connections; — network sockets; and — streaming sockets. NOTE The network descriptor is static and known a priori.	

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REQ	7.6 AL – Network supervisor relies on network descriptor
Based on the network descriptor, the network supervisor shall determine which nodes are permitted to join the MOST network.	

An example of a network descriptor is provided in Annex C. The status of Annex C is informative.

7.3 Remote node

REQ	7.7 AL – Remote node structure
A remote node shall not contain the network supervisor or the lean network services.	

Network management and connection management are provided by the MNC.

REQ	7.8 AL – Remote node reacts on requests
The MNC of a remote node shall answer lean network service requests.	

Figure 5 specifies the remote node. The application consists of software and/or hardware. It exchanges streaming data and packet data with the MNC.

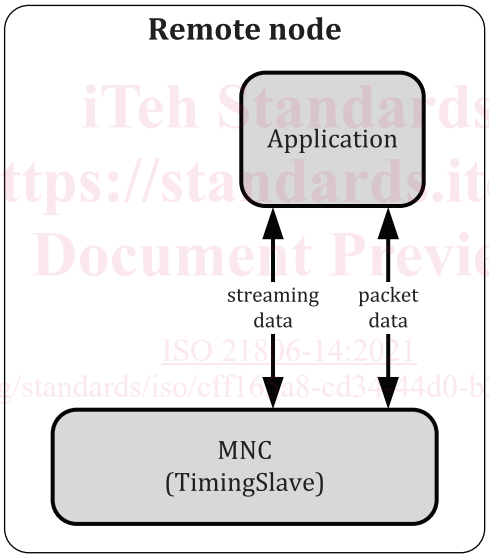

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Figure 5 — Remote node

7.4 Listen-only node

For network analysis purposes, a certain node kind exists that does not change the content of network frames. A listen-only node is invisible to other nodes.

8 Node addressing

REQ	7.9 AL – 16-bit address area structure
For 16-bit addressing, the address area of an MNC shall be structured as specified in Table 1.	

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