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AMI-C Power Management Specification
v1.00

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1394 Trade Association

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Abstract
This specification is based on the AMI-C 3023 Power Management Specification v1.00. The scope of this document is to describe functional specification at system and unit level for an in-vehicle 1394 network.

Keywords
IEEE 13994, Serial Bus, AMI-C, Automotive, Power Management
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# Revision log

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**Document title**
AMI-C Power Management Specification

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Foreword

Introduction

1 Scope

The scope of this document is to describe functional specification at system and unit level for an in-vehicle 1394 network.

The document is organized in the following manner:

(1) Specification for system
(2) Specification for Host unit
(3) Specification for Device unit
(4) Specification for Communication Protocol between units
(5) Specification for legacy devices

These specifications describe basic PM basic first and then go on to describe the individual requirements for POF and metal networks afterwards.

2 References

The following documents form a part of the specification to the extent specified herein.

In the event of a conflict between the text of this specification and the documents cited herein, the text of this specification takes precedence.

2.1 Normative references

None.

2.2 Informative references

(1) AMI-C Power Management EPoC System Description
(2) 2001_AMI-C Network Protocol requirements for Vehicle Interface Access v1.00
(3) 3003 AMI-C requirements and guidelines for 1394 Automotive networks v0.91 030612
(4) 2002 AMI-C Common Message Set v1.01
(5) TA Document 2001018 1394 AutomotiveSpecification(IDB1394) 1.0
3 Definitions

3.1 Glossary of Terms

3.1.1 Shutdown: It means that it turns off the power of the whole node including App., Link, PHY. It is Shutdown of node of the whole Network and does not do Shutdown of individual node.

3.1.2 Wakeup: It means that it turns on the power of the whole node including App., Link, PHY. It is Wakeup of node of the whole Network and does not do Wakeup of individual node.

4 Specification

4.1 Specification for System level

The Power Management Model is shown in Figure 1. In this model, system has the following functions.

(1) HOST UNIT has the System Manager, which among other things, also does the Power Management of the whole network. Hence, the power management part of the System Manager is called the System Power Master (SPM). The power management part also includes the local node level power Management of the Host itself implying the functionality of the Local Power Manager (explained below).

(2) Device UNIT, which is basically a 1394 network device, contains the Local Manager, which among other things, does Power Management of the device based on commands from the System Power Master. The Power Management part of the Local Manager is called Local Power Manager (LPM). The Local Power Manager is present in all devices, including the host, and is responsible for actually changing the state of the device.
(3) Power Line provide the electric power to each devices. This is not used to communicate to do Power Management.

(4) A protocol to transmit information regarding Power Management on 1394 Line. This is called the **Power Management Protocol (PMP)**

Furthermore, if there is a need, the network shall be partitioned into smaller areas or sub-networks to improve power controllability so that the system becomes capable of supporting wake ups of these subnetworks as well as the complete network. The Sub-Network Model is shown in Figure 2.

This would require sub-network level power management and hence, sub-network level System Power Masters, which can be termed as **Sub-Network Power Manager (SNPM)**.

![Figure 2 – Management of partitioned network(Sub-Network)](image)

### 4.2 Specification for Host unit

The Host-unit exists in a system to do Power Management of the whole network. There are the following functions for this unit.

(1) The Host-unit always watches the position of the Ignition key. According to the position, the Host-unit notifies a Device-unit or a Sub-network of indication of a device or Sub-network power-on or shutdown in the system using a command on **1394 Line**.

(2) Following are the commands from the Host Unit sent over the 1394 Line.

- Power-on command
- Shutdown command

(3) Host Unit also has the ability to define which Sub-network each Device Unit belongs to.

(4) Host unit is responsible for notifying each Device Unit of the power state change in the network. Managing the power state of individual Device-Units in
response to these notifications is the responsibility of the local Power Management functionality of each Device Unit.

4.3 Specification for Device unit

Following are the functions of each Device Unit.
1. In every power state of a Device unit, the unit watches for a command on 1394 Line. Each Device unit has the capability to execute power-on processing or shutdown processing of its own device and unit according to the command received on the 1394 Line.
2. Device-unit also manages the state of PowerON/OFF of the device done by user operation of the power switch of the Device itself.

4.4 Specification for Communication Protocol between units

Following are the power management related communication messages between Host and Device Units to do power management.

1) PowerON Command/Response

PowerON Command/Response sequence is shown in Figure 3.

Command: This is sent from the Host-unit to the Device-unit in order to command the Device-unit to indicate the PowerON status.

Response: This is sent from the Device-unit to the Host-unit. Device-Unit sends back a Power-status information corresponding to the point in time when it received the PowerON command. This is same as the Response to PowerStatusCommand described in (3) later.

![Figure 3 – PowerOn sequence](image)

(2) Shutdown Command/Response

Shutdown Command/Response sequence is shown in Figure 4 and Figure 5.
**Command:** This is sent from the Host-unit to the Device-unit in order to command the Device-unit to execute the Shutdown process of the device.

**Response:** This is sent from the Device-unit to the Host-unit as a response of having received a Shutdown command.

![Diagram of Shutdown Processing](image)

**Figure 4 – Shutdown Processing (normal case)**

![Diagram of Shutdown Processing (force shutdown)](image)

**Figure 5 – Shutdown Processing (case of force shutdown)**

**Waiting time**

T1: When a device replied with 'NG', it is time to wait for till a host sends Shutdown once again. The value is 1 seconds. (tentative values)
T2: When a device continues replying with 'NG', it is time to wait for till a host sends compulsion Shutdown. The value is 5 seconds (tentative values).

3) PowerState Request/Response

An example for PowerState Request/Response sequence is shown in Figure 3.

Request: This is sent from the Host-unit to a Device-unit in order to request the Device-unit for the current power state of the Device.

Response: This is sent from the Device-unit to the Host-unit in response of having received a Power State request message.

4.5 Specification for legacy devices

A function of power management for legacy device is implemented with a device having CCP to connect legacy device. Legacy device does not receive the power management command directly. Legacy device receives supply of electricity from a power supply line of the 1394 cable which connected to CCP. Therefore the Power ON/OFF of electricity to legacy device links a power supply state of a device having CCP.

5 Individual specification

5.1 Specification for POF cable

Wakeup of physical layer is done with a signal transmitted using Power Mode (PM)-Line. This signal has meaning of command to do Wakeup of PHY in
a node. The node that received a message of this signal executes Wakeup processing. The all sequence from Key-PositionON to OFF at having used POF cable is shown in Figure 7.

![Figure 7 – All Sequence diagram for PowerON/Shutdown](The case at having used POF)

### 5.2 Specification for Copper cable
(It will be determined in the future.)
## Annex A  Requirement and recommendation language

### A.1 Requirements

The following verbal forms are indicative of requirements that are to be followed in order to achieve conformance to this specification. No deviation is permitted from a requirement.

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### A.2 Recommendations

The following verbal forms are indicative of recommendations or courses of action that are preferred, but are not necessarily required.

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## Annex B Request for change form

Use this form to identify errors or deficiencies or to recommend general changes.

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