SCSI Protocol Service Model

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Purpose of the Reference Model

- To define a structure for specifying requirements.
- To provide a standard interface between SAM and the protocol standards.
- To eliminate inconsistencies among specifications.
- To specify requirements in a manner thatt:
  - Make it easier to design portable applications and microcode.
  - Can be easily translated to an implementation.
    - Implementation behavior must comply with the requirements. However...
    - Implementation designs are not required to conform to the model.

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Parts of the Protocol Service Reference Model:

- Service Delivery Primitives - A set of protocol-independant primitives available at the service delivery interface.
  - Behavior is defined in SAM.
  - Mapping to a specific SCSI protocol is specified in the protocol standard.
- A standard set of layers.
- A model for service and protocol transactions.
  - A uniform model for the service interface between layers.
  - May be applied to all layers.

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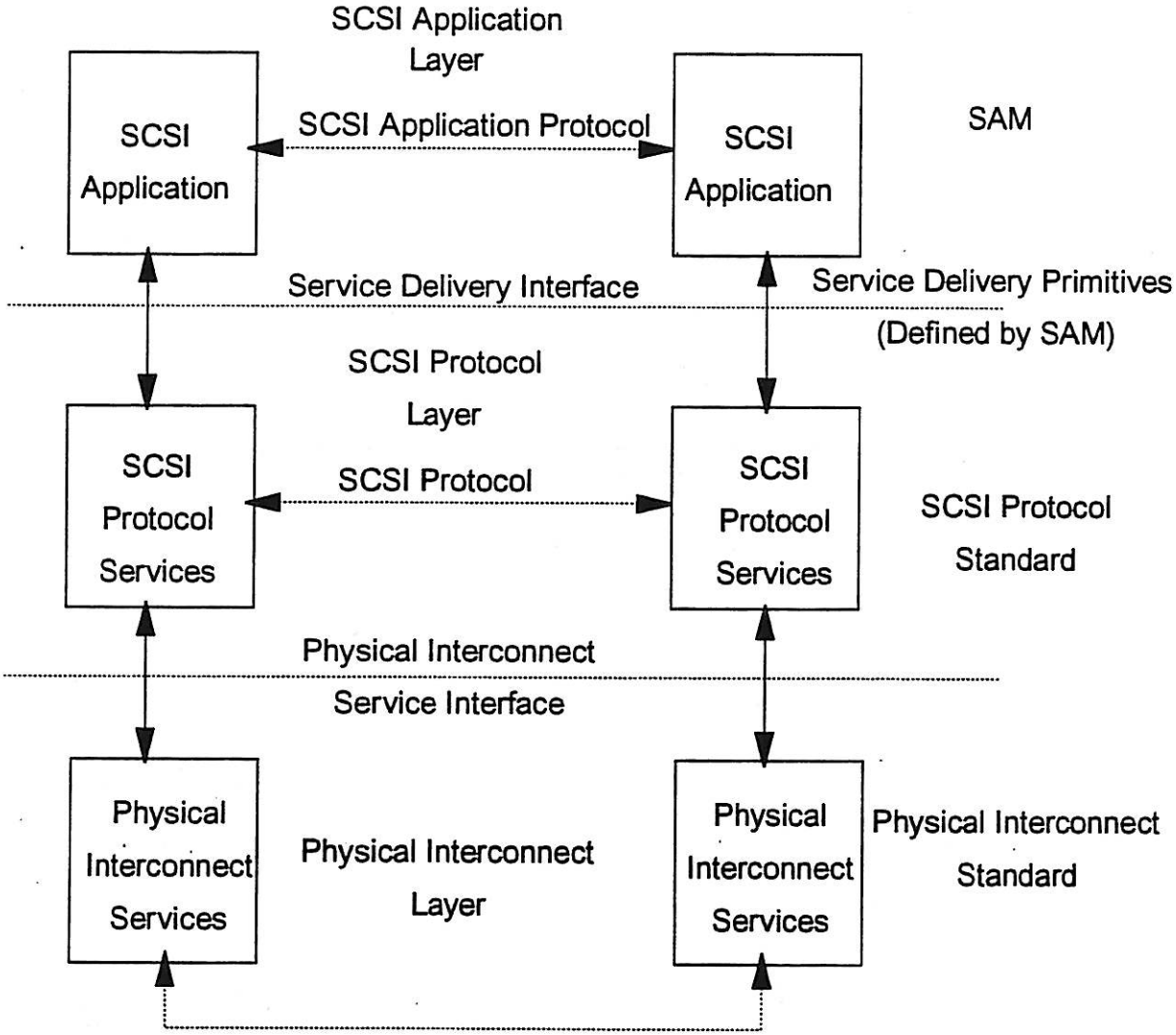
Reference Model for Architecture and Protocols



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Definitions

- Upper Level Protocol (ULP) - A protocol executed through services provided by a lower protocol layer.
- Lower Level Protocol (LLP) - A protocol used to carry the data representing upper level protocol transactions.
- Request - A call to the LLP from the ULP layer to begin a service transaction.
- Indication - A spontaneous signal from the LLP service layer notifying the ULP that a peer-to-peer protocol transaction has been received.
- Response - A peer-to-peer reply from the ULP which is sent to the LLP service layer for delivery.
- Confirmation - A signal from the LLP notifying the upper layer that a peer response has been received.

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SCSI Application Protocol Semantics

- SAM application protocol is based on client-server model.
- Client-server interactions are modelled as remote procedure calls from application client to device server or task manager.
  i.e.,

  Server Response = Procedure Name (Inputs... || Outputs....)

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Types of Service Provided by LLP

- Peer-to-Peer Service - A service invoked by an upper level protocol layer to exchange information with its peer.
- Lower Layer Service - A service provided by the LLP which does not result in an exchange of information between ULP peers.
- Confirmed Service - A service requiring completion confirmation.
- Unconfirmed Service - A service not requiring confirmation.

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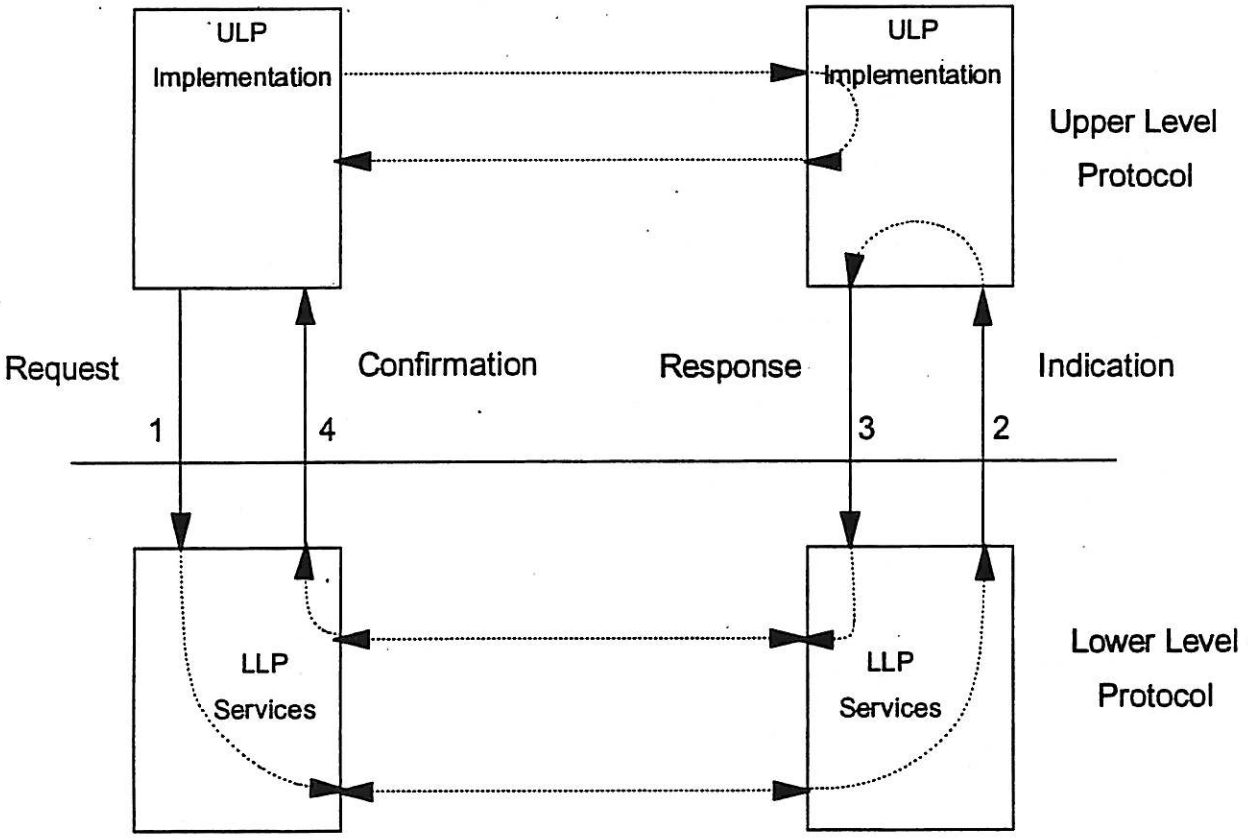
Service Interface Model: Peer-to-peer, Confirmed



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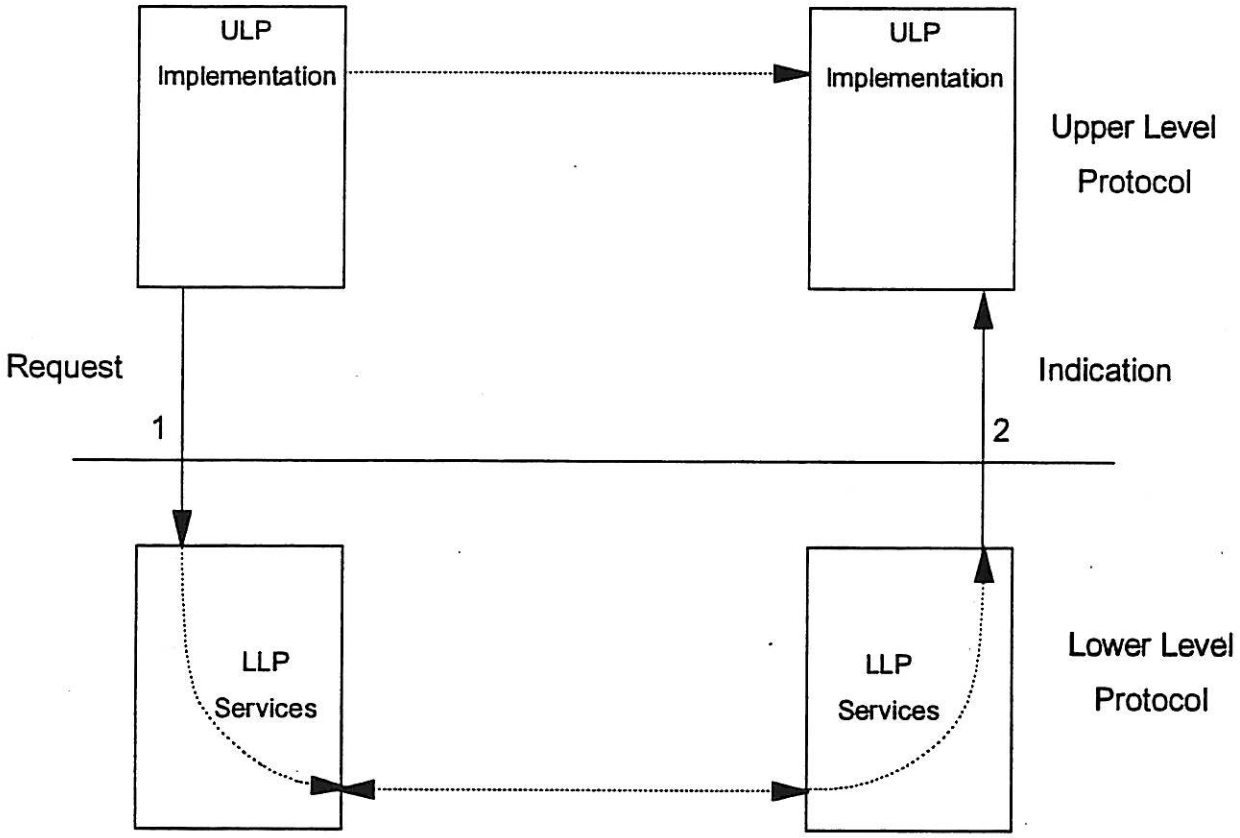
Service Interface Model: Peer-to-peer, Unconfirmed



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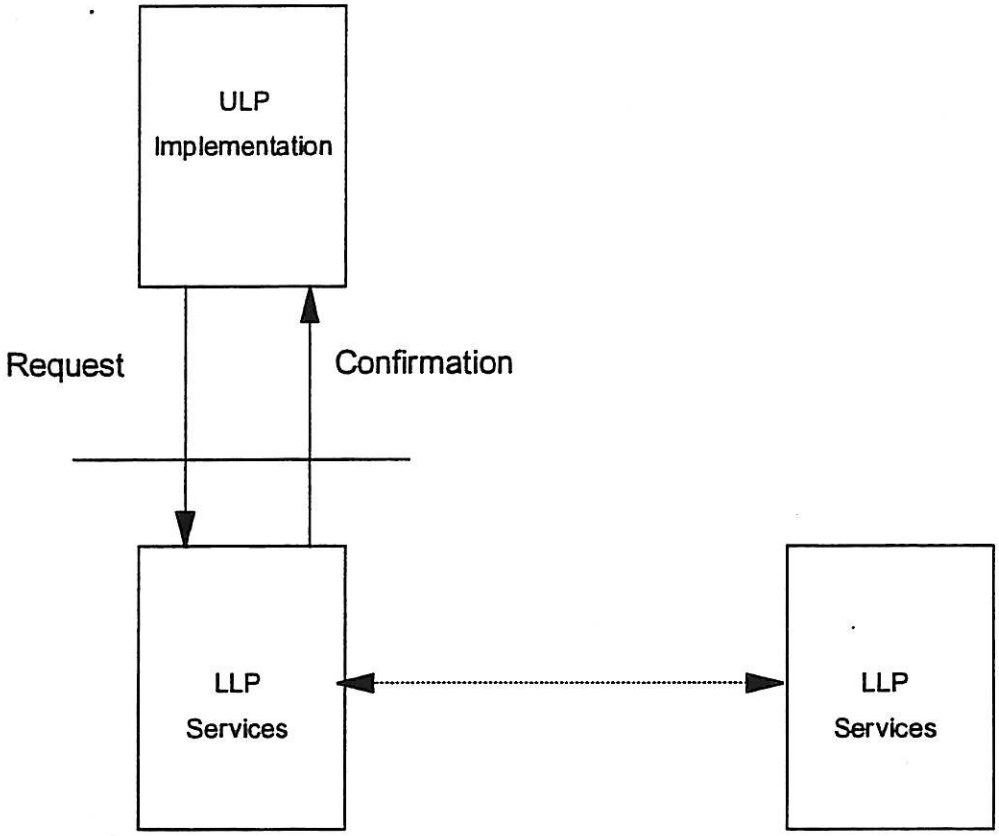
Service Interface Model: Lower Layer, Confirmed



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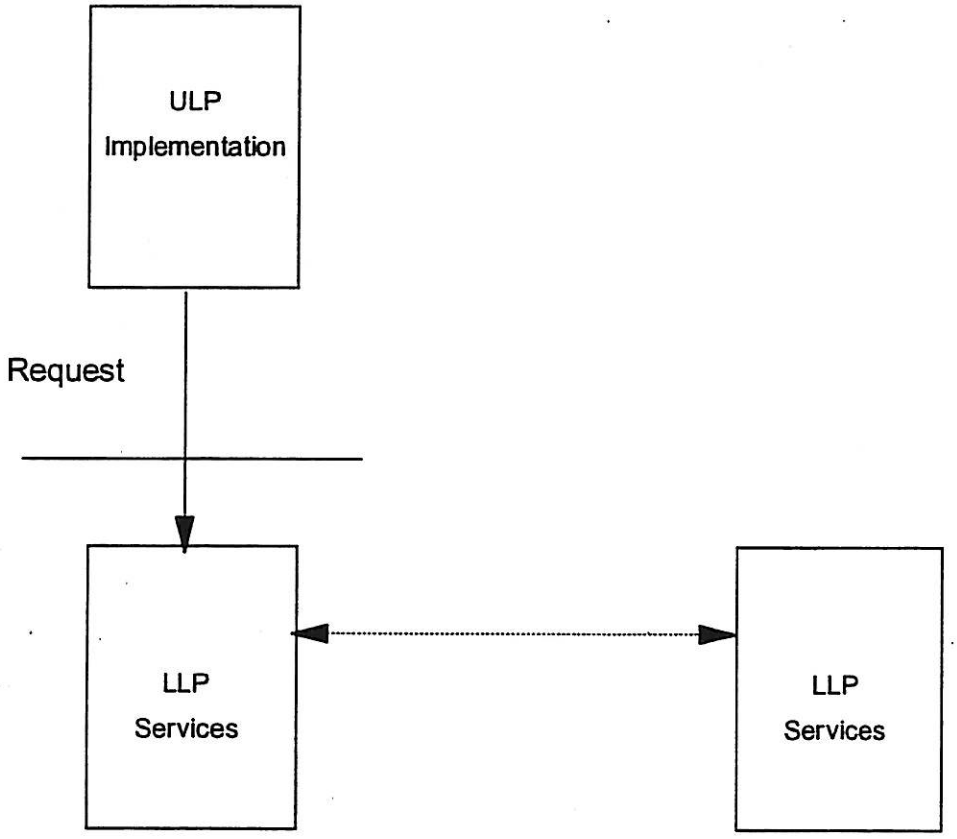
Service Interface Model: Lower Layer, Unconfirmed



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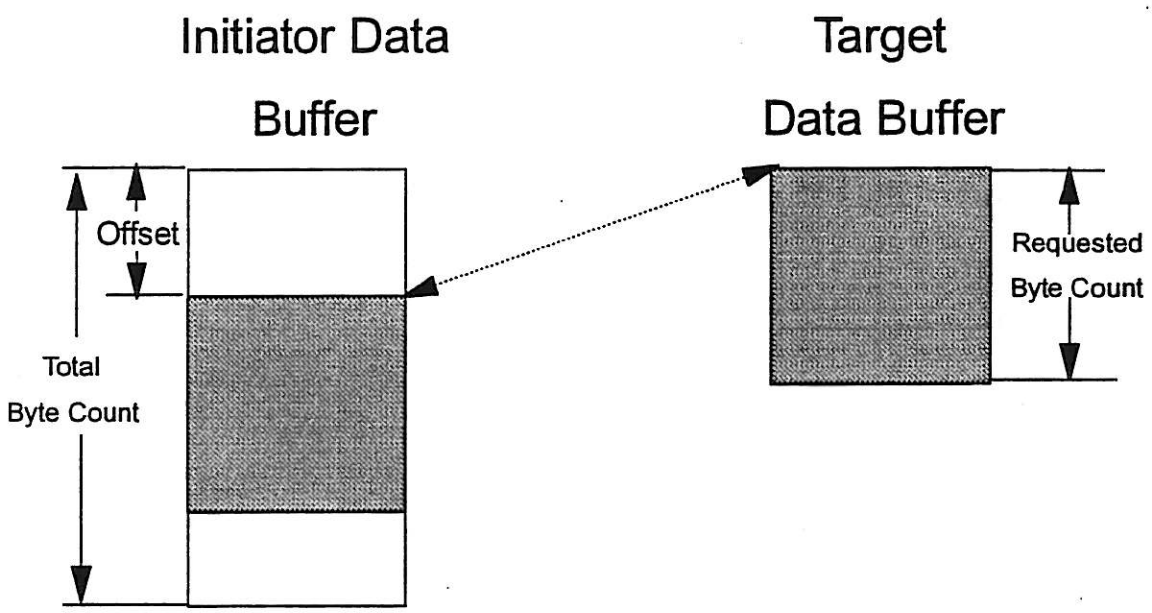
Model for Buffered Data Transfers



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SAM Service Primitives

Command Execution Service

Service Type: Peer-to-peer Confirmed.

Requestor: Application Client

Request:

Send SCSI Command(Task Identifier, Task Attribute, Command Descriptor,
[Data-Out Buffer Pointer] || [Data-In Buffer Pointer],
[Autosense Buffer Pointer],Status)

Indication received by Device Server:

SCSI Command Received(Task Identifier, Task Attribute, Command Descriptor,
Autosense flag)

Response from Device Server:

Send Command Complete(Task Identifier, Pointer to Autosense Data,
Autosense flag, Status

Autosense flag set if sense data is to be sent to application client.

Confirmation received by Application Client:

Command Complete Received(Task Identifier, Status)

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SAM Service Primitives

Data Delivery Services

Inbound Data Transfer

Service Type: Lower Level Confirmed.

Requestor: Device Server

Request from Device Server:

Send Inbound Data (Task Identifier, Device Server Buffer Pointer,
Application Client Buffer Offset, byte count)

Confirmation:

Data Delivered(Task identifier)

Description:

Input data was successfully delivered to the initiator's LLP service layer.

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SAM Service Primitives

Data Delivery Services

Outbound Data Transfer

Service Type: Lower Level Confirmed.

Requestor: Device Server

Request from Device Server:

Receive Outbound Data (Task Identifier, Device Server Buffer Pointer, Application Client Buffer Offset, byte count)

Confirmation:

Data Received(Task identifier)

Description:

Outbound data was successfully transferred to the device server's buffer.

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SAM Service Primitives

Task Management Service Primitives

Service Type: Peer-ro-peer, Confirmed.

Requestor: Application Client

Request from Application Client:

Send Task Management Request (Object Identifier, Function Identifier)

Indication received by task manager:

Task Management Request Received(Object Identifier, Function Identifier)

Responses from Task Manager:

One of the following:

Send Task Management Function Completed(Object identifier)

Send Task Management Function Rejected(Object Identifier)

Confirmations to application client:

One of the following:

Received Task Management Function Completed(object identifier)

Received Task Management Function Rejected(object identifier)

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