

ML280: iSCSI ARCHITECTURE & INSTRUMENTATION



ML280 is an introduction to the technical fundamentals of the iSCSI architecture. It is intended for anyone requiring an introduction to iSCSI architecture including: Design Engineers, Field Application Engineers, Test Engineers and Technical Marketing professionals.

COURSE OBJECTIVE

Students develop a working knowledge of the latest iSCSI architecture and behavior through lecture and protocol analysis exercises.

COURSE OUTLINE

- Basic Elements of iSCSI
- iSCSI Architecture and the Network
- iSCSI Communication: Protocol Data Units
- Naming, Addressing and Discovery
- Configuring iSCSI Targets: The Login Process
- Mapping SCSI into iSCSI
- iSCSI Error Detection and Recovery

ANALYZER EXPERIENCE

Interspersed with the lecture sections, student's analyze iSCSI traces using the latest Finisar Xgig® Trace Viewer and Expert software.

PREREQUISITES

Previous experience with storage or IP networking is helpful, but not required.

COURSE LENGTH

3 days.

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DETAILED COURSE DESCRIPTION

BASIC ELEMENTS OF ISCSI

This section identifies the basic features of and the premises upon which iSCSI products have been designed to date. iSCSI is discussed in terms of the OSI model of computer networking. Upon completion students are able to:

- Define iSCSI.
- Identify the basic features of iSCSI.
- Compare iSCSI to other storage networking technologies.

ISCSI ARCHITECTURE & THE TCP/IP NETWORK

This section discusses the architectural design of iSCSI and the implications of transport through the TCP/IP network. iSCSI-specific objects and terminology are identified. iSCSI transmission inside of the TCP/IP stack is discussed and illustrated. Upon completion students are able to:

- Identify the roles of TCP and IP.
- Identify when a new TCP connection is created.
- Define iSCSI Node, Network Entity, Session, Connection and Target Portal Group.
- Describe an iSCSI Portal Group and identify how it is used.
- Describe how segmentation by other network layers affects iSCSI transmission.

ISCSI COMMUNICATION: PROTOCOL DATA UNITS

This section introduces the iSCSI Protocol Data Unit (PDU) format and usage. Upon completion students are able to:

- Describe the function of an iSCSI Protocol Data Unit (PDU).
- Identify the headers in an iSCSI PDU and when each is used.
- Describe the iSCSI layer acknowledgement model.

ISCSI DISCOVERY

This section covers the discovery of iSCSI objects, including the use of iSNS. iSCSI traces are used to illustrate the iSCSI discovery process. Upon completion students are able to:

- List the key information sought during discovery.
- Describe how iSCSI uses the SendTargets discovery method to find Targets.
- Describe how iSCSI nodes register with and query the iSNS server.

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CONFIGURING TARGETS: THE LOGIN PROCESS

This section covers the Normal Login process in iSCSI. Students study several login traces representing the login processes of a variety of iSCSI vendors. Upon completion students are able to:

- Identify the 2 types of iSCSI Login.
- Define how the iSCSI Login relates to the TCP connection.
- Explain the 2 stages of the Login process.
- List the components which may be negotiated during Security Negotiation.
- Describe how iSCSI handles in-band authentication (CHAP) within the Login process.
- List multiple components which may be negotiated during Operational Negotiation.
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MAPPING SCSI INTO ISCSI

This section covers the actual mapping of SCSI commands, data and status into iSCSI PDUs. Trace analysis covers various SCSI commands (e.g. Read, Write, Inquiry, Test Unit Ready) carried on the iSCSI transport layer. Upon completion students are able to:

- Associate SCSI commands, data and status with the appropriate iSCSI PDU.
- Identify the flow of an iSCSI transmission.
- Explain under what circumstances the SCSI Status phase may be collapsed into the Data Phase in iSCSI, including how this effects the layout of the PDU.
- Identify how targets use R2T PDUs to flow control SCSI Write operations.
- Locate embedded PDUs in GbE frames on any protocol bit analyzer.

ISCSI ERROR DETECTION AND RECOVERY

This section discusses the error recovery hierarchy as outlined in the iSCSI draft specification. Students analyze controlled traces for errors and recovery processes ranging from failed login negotiation to SCSI Check Conditions. Upon completion students are able to:

- Differentiate between the 3 main iSCSI error recovery levels, identifying the dependencies of each.
- Identify how digest errors effect iSCSI transmission flow.
- Identify how iSCSI recovers from errors that are within-command and within-connection.
- Describe how iSCSI detects and recovers from connection failure.
- Describe the effects of iSCSI Session Recovery.