Network Data Management Protocol

(NDMP)

What is it?

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7th March 2000
Connectathon 2000
San Jose

NetworkAppliance®

Overview

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Overview

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What is NDMP?

- Protocol that facilitates interoperability between backup management applications and storage appliances for the purpose of backup and restore of data.

- V1 and V2 drafts submitted to the IETF :-)
- However, no RFC issued :-(

- Check out the web site http://www.ndmp.org
  - V1, 2 & 3 draft specs
  - Software development kits (SDK) available
  - Contributed software

Where did it come from?

- Dave Hitz and Roger Stager, founders of Network Appliance and PDC respectively focused on the specific issue of how backup management software supports storage appliances.
- Both rsh & NFS mounted solutions were in use and still are today, but managing errors and optimizing these solutions for performance was viewed to be challenging at best.
- Each side took the "appliance approach" and focused on their strengths:

Where did it come from?

- Backup management vendors
  - Present a GUI to the system administrator
  - Schedule backups
  - Keep track of what files are in a backup so that the data can later be restored with single file granularity.
- Storage appliance vendors
  - Can optimize their own backup and restore methods since they understand the layout of and provide access to their data/storage
  - Can easily track their own file system or hardware changes.

NDMP Interfaces

- Communication is performed via XDR encoded messages
- Messages are grouped into several interfaces:
  - NDMP client initiated
    - CONNECT - Session creation/authentication
    - CONFIG - Info about the NDMP server
    - SCSI - Tape library access
    - TAPE - Tape drive access
    - DATA - Backup method interface
    - MOVER - Tape server
  - NDMP server initiated
    - NOTIFY - Alert client of state change
    - LOG - Text back to client GUI
    - FILE HISTORY - Meta data channel

NDMP V1 Model

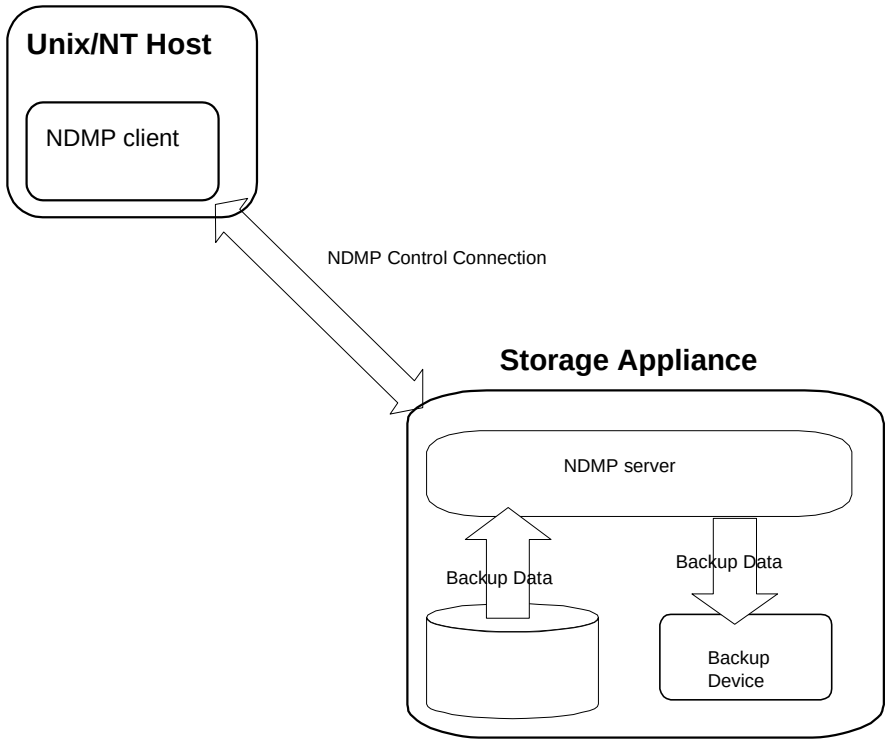

Figure 1 - NDMP client backing up data to a local tape device

Establishing a Connection

- NDMP client first connects to a well known port (10,000).
- NDMP server accepts the connection and sends an NDMP_NOTIFY_CONNECTED message.
- NDMP client then sends an NDMP_CONNECT_OPEN message.
- NDMP client will be authenticated by the NDMP server using an NDMP_CONNECT_CLIENT_AUTH message.
- Optionally, the NDMP client may use an NDMP_CONNECT_SERVER_AUTH message to authenticate the NDMP server as well.

NDMP (V2/V3) Model

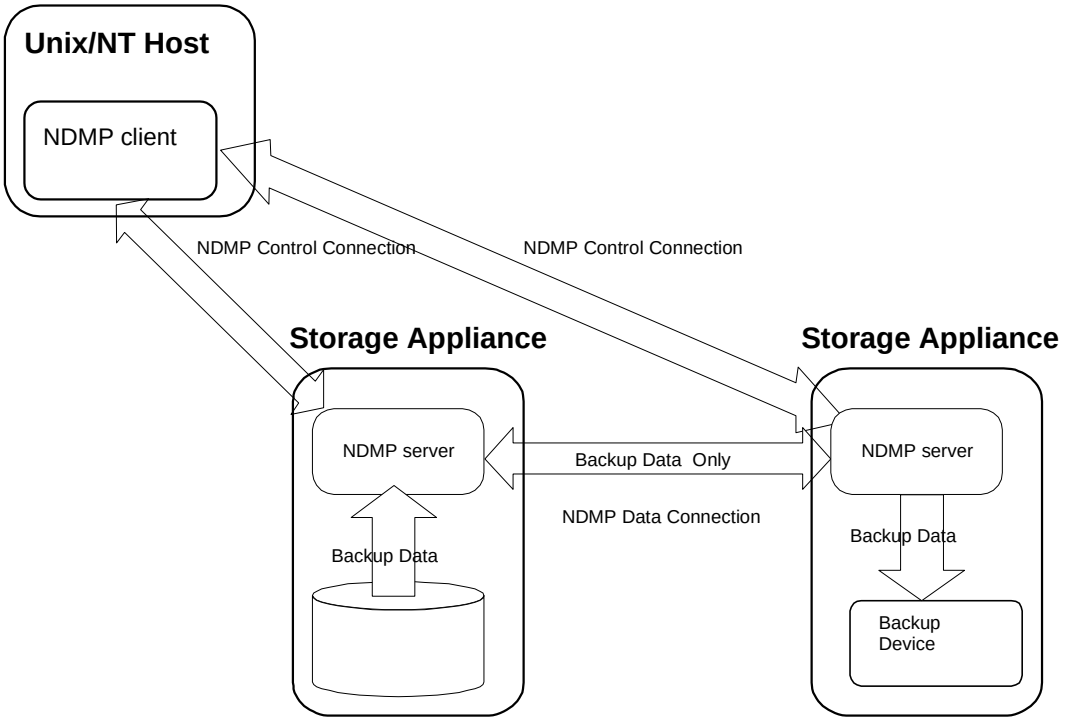

Figure 2 - NDMP client backing up data on a tape-less file server to another file server with a local tape device

NDMP Data Server

- NDMP client makes a connection to the server on a well known port (10000) and after authentication it is free to send any command it wants, e.g. DATA, TAPE or SCSI.
- Generates/reads from a single data stream, tape spanning, etc is transparent.
- State driven, can't start a backup until the data stream connection has been setup, certain messages can only be processed in certain states, etc.
- The Data Server maintains state such as bytes processed so the NDMP client can determine the size of a backup.

NDMP Attributes

- NDMP is tape format independent
- No backup methods are defined in NDMP. They are implementation specific. The list of supported methods can be easily added to:
  - Auspex supports tar
  - NetApp supports dump
  - NetApp can add methods via kernel changes or installing java data modules or ‘dumplets’
  - NDMP environment variables flow between the client & server to describe additional options
- Backup method functionality is extensible:
  - NDMP environment variables flow between the client & server to describe additional options

NDMP Near Future?

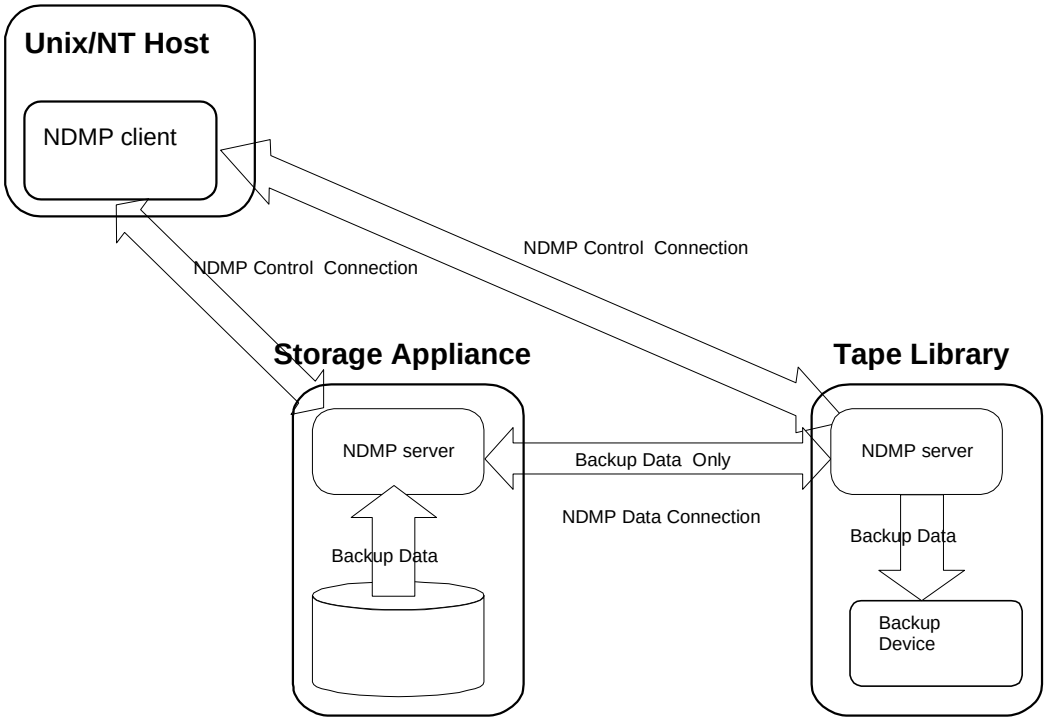

Figure 3 - NDMP client backing up data on a file server to a network attached tape library

NDMP Mover (Tape Server)

- Controls the reading/writing of backup data from/to a tape device.
- During a backup the MOVER reads data from the data stream connection, buffers the data into tape records, and writes the data to the tape device.
- During a restore the MOVER reads data from the tape device and writes the data to the data stream connection.
- Responsible for handling tape exceptions and notifying the NDMP client.

NDMP V3

- Added Data Server -> Data Server support
- Added Tape Server -> Tape Server support
- Data stream connections can now be initiated in either direction
- Added more configuration information
- Updated file history to support NT names as well as UNIX
- UTF8 support added, but not implemented by any vendors thus far.

Where is it now?

- Becoming/is de facto backup standard for NAS solutions
- 11 companies at Connectathon with shipping products testing interoperability for the first time:
  - NDMP clients
    - HP, Legato, Veritas, Workstation Solutions
  - NDMP servers
    - Auspex, CrosStor, EMC, Mirapoint
    - NetApp, Procom, Traakan
- Many others investigating or developing products

NDMP Issues

- Current specification is vague/ambiguous & has many inconsistencies.
- Leads to problems with interoperability, that's why we're here at Connectathon!
- Protocol biased towards optimized implementations.
- Limited to 1-1 relationship between Data Server and Tape device.
- Meta data channel is UNIX centric.
- Some functionality is implied rather than explicit, e.g. Direct Access Restore (DAR).

Where is it going?

- NDMP V4 Scope:
  - Evolutionary next step from V3
  - Improve Interoperability
  - Extensibility via a new translator (X-late) service
  - Adding Support for Snapshots
  - Adding SAN Support
  - Improve NDMP Session Management
- SNIA (pre-standards body)
  - Working group proposal
- IETF (standards body)
  - RFC (for sure)