TL1 Device Monitoring on the Cheap

Rachel K. Bicknell
NANOG38
Rachel at ufp dot org
Presentation Overview

- Motivation.
- What is TL1?
- TL1 network monitoring tools.
- TL1 to SNMP Translation.
- Questions and Answers.
Why TL1?

- TL1 Managed Devices (SONET/TDM)
  - Company purchased outsourced monitoring from the equipment vendor, at high cost.
  - Most of the gear did not support TCP/IP natively.
    - Buying software from equipment vendor to do “virtual” TCP/IP and SNMP was expensive and time consuming.
- Monitoring in house would be costly.
  - TL1 monitoring packages are expensive.
  - Vendors charge extensive fees for the specifications on how to monitor their devices.
- Could TL1 be converted to SNMP?
  - Standard network monitoring tools could be used.
  - Monitoring could be in-sourced at low cost.
What is TL1?

• TL1 is an acronym for Transaction Language 1.
• TL1 is an ASCII-based instruction language.
• TL1 is the dominant management protocol for TDM and optical telecommunication devices because it is a Telcordia GR-833 standard (once known as Bellcore).
• [http://www.tl1.com](http://www.tl1.com) is the best place to find in-depth information about TL1.
History of TL1

• Before 1984, there was the Stone Age.
  ◆ Each TDM vendor implemented their own type of ASCII-based control language.

• Bellcore created the wheel.
  ◆ They developed TL1 as a standard in 1984 for controlling TDM network elements, via Telcordia GR-833.

• Everyone thought the wheel was a good idea, especially because the RBOC’s demanded it.
  ◆ By 1985 TDM most vendors use TL1 for their network elements.

• The wheel is still used today!
  ◆ SONET and optical vendors also use TL1.
Breakdown of a TL1 Command

SET-ATTR-EQPT:TID1:OC3-8:1234::NTFCNCDE=MJ,CONDTYPE=LOF;

1. Command code block
2. Staging block
   a. target identifier (TID)
   b. AID block
   c. correlation tag (CTAG)
   d. general block
3. Payload block
An Example TL1 Command and Output

; RTRV-ALM-ALL:NODEB::1234;
<

NODEB 06-07-17 16:26:32
M 1234 COMPLD
"NP,EQPT:MN,INT,NSA,06-14,03-19-08,NEND,NA:"Remote Alarm(s)"
"OC48-12,OC48:CR,LOS,SA,06-15,08-47-23,NEND,RCV:"OC48 Rx Loss Of Signal"
"OC3-9-2,OC3:MN,LOS,NSA,06-20,12-43-56,NEND,RCV:"OC3 Rx Loss Of Signal"
"OC3-9-2,OC3:MN,LOS,NSA,06-20,12-43-56,NEND,RCV:"OC3 Rx Loss Of Signal"

;
Shortcomings of TL1

• TL1 is **not** a user friendly language.

• Vendors like to add additional commands to the Telcordia specification.

• Many network monitoring programs do not have network agents for TL1.
TL1 For Network Monitoring

ACT-USER - Activates the users login & password.

```
ACT-USER::username:1::password;
```

RTRV-ALM-ALL - Retrieve all the alarms on a particular node or device.

```
RTRV-ALM-ALL:NODEB::1234;
```

CANC-USER - Deactivates the user.

```
CANC-USER::username:1;
```
Other Useful TL1 Commands

To Create a Network Inventory List

- RTRV-EQPT - Retrieve a list of equipment in the device
  **RTRV-EQPT:NODEA:SLOT-ALL:123;**

- RTRV-INV - retrieves inventory data on equipment.
  **RTRV-INV:NODEA:SLOT-ALL:123;**
Non-standard TL1 Commands

Cisco has added some vendor proprietary commands that are not in the Telcordia GR-833 specification:

- RTRV-ALM-BITS - alarm conditions for the Building Integrated Timing Supply (BITS).
- RTRV-ALM-ENV - synchronization reference list used for BITS output clock.
- RTRV-ALM-SYNCCN - retrieves the environmental alarms.

You can find out more about these commands at -

http://cco.cisco.com/univercd/cc/td/doc/product/ong/15400/r60docs/r60tl1cm/index.htm
Options For Monitoring TL1 Network Devices

• Buy an expensive monitoring package from the network device vendor.

• Buy a TL1 agent to add to your existing network monitoring program.

• Use open source tools to monitor TL1 devices.
Commercial Tools to Monitor TL1 Devices

- TL1 Agents for Network Monitoring
  - Monfox DynamicTL1 Manager SDK
    (www.monfox.com/dtl1/java-tll-agent-api.html)
  - Advent TL1 Agent Toolkit (www.adventnet.com)
- TL1 Emulators (With 30 Day Trial Versions)
  - iReasoning Networks TL1 API
    (www.ireasoning.com)
  - Advent TL1 Agent Toolkit (www.adventnet.com)
  - SimpleSoft TL1 simulator (www.smplsft.com)
Open Source Tools to Monitor TL1 Devices

Open source Perl programs for managing network devices using TL1


2. Steven Hessing’s CPAN TL1 modules (http://search.cpan.org/~stevenh/Net-TL1-0.05/)
SARA Computing & Network Services TL1 Toolkit

• Toolkit enables the retrieval of information from different types of vendor devices without having to know the exact details of how the TL1 command works.

• This module currently has specific retrieve functions for Nortel OME6500, Nortel DWDM CPL, Nortel HDXc and Cisco ONS15454 equipment.

• Can also be used to execute TL1 commands on any TL1 capable device.
CPAN Net::TL1

• Open source CPAN Perl extension written by Steven Hessing for managing network devices using TL1.

• Net::TL1 provides a framework to develop specific commands for optical devices running TL1.
It should be possible to write a fully functional TL1 to SNMP translation agent. This would enable one to use SNMP network monitoring tools.
Proof of Concept Program

- Andree Toonk of SARA wrote a proof of concept TL1 to SNMP Perl script.
  
  https://noc.sara.nl/nrg/TL1-Toolkit/alarms-snmptrap.pl.txt

- This Perl script goes into the TL1 device, retrieves the TL1 alarms and generates an SNMP trap with the OID sysContact.0, containing the TL1 alarms in text.
Any Questions?
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