

TL1 Device Monitoring on the Cheap

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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?

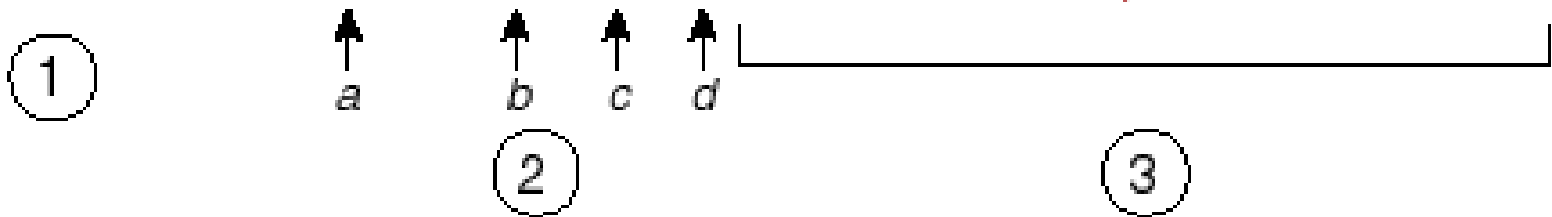
- TL1 is an acronym for Transaction Language 1.
- TL1 is an ASCII-based instruction language.
- TL1 is the dominant management protocol for TDM and optical telecommunication devices because it is a Telcordia GR-833 standard (once known as Bellcore).
- **<http://www.tl1.com>** is the best place to find 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-SYNCN - 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/r60t11cm/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/dt11/java-tl1-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.smp1sft.com)

Open Source Tools to Monitor TL1 Devices

Open source Perl programs for managing network devices using TL1

1. SARA Computing & Network Services TL1 Toolkit (<https://noc.sara.nl/nrg/TL1-Toolkit/index.html>)
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.

TL1 to SNMP Proxy

- 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-snmpttrap.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?

People I Owe Thanks To

- Andree Toonk and Ronald van der Pol of SARA
- Marty Hannigan
- Majdi Abbas
- Todd Underwood
- Leo Bicknell
- Ren Provo