ADVANCED OPERATIONAL ENVIRONMENT

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Product Manager
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Agenda

- Integrated Management
- AOE Discussion
  - Describe the Advanced Operational Environment
    - Automation
    - Service Assurance
    - Service Activation
    - Network Design
- Roadmap and Direction
Intelligent Service Activation
Application awareness
OSS integration via Robust OSS Gateway (TL1/XML)

Strong Decision Support
Fault Response
Service Aware Testing, Troubleshooting and Diagnostics

Advanced PM, Traffic and Capacity Management
Performance Monitoring/Trending
Traffic Engineering
Voice/Video Quality Monitoring

Fully Integrated from Planning to Operations to Customer Service
Network Management via AOE

- **Automated** service activation – integration with existing billing, provisioning, equipment plant, etc OSS systems
- **Service-centric** for the user – abstract the hardware away from user and the OSS management systems; only services
- **Expert System** - new level of system logic to distill data down to a few actionable items
- Provide standards-based interfaces to interoperate in *Multi-vendor* environment
ADTRAN Network Management Components and Functions

- OSS
- Service Mgt
- OSS G/W
- EMS
- NE
- Hardware Mgt
- Flowthrough activation
- Web Access

AOE

Knowledge

Information

Data
Direct management requires operator knowledge of specific hardware: not easy to integrate or maintain.

OSS/IT integration effort is improved by using the ADTRAN GW. The IT interface is guaranteed not to change. Additionally, multiple ADTRAN device types use same API’s.

Further time to market improvements and product selection options made possible through standardized and open IT interfaces.
• Universal access via web-based user interface
• Service and subscriber-oriented; technology and hardware agnostic.
• Simplifies OSS integration; quicker, reduces costs.
• Incorporates intelligent logic system to reduce voluminous element and network data to a few actionable operations, results and recommendations.
• Significantly reduces activation and assurance time demands.
Complete Service Visibility

- Layer 1 through service layer analysis
- Simple and detail views in one screen
- Easily stored, transmitted via e-mail and/or northbound interface
- Any service, any technology

| Status | PM | Test Results | Provisioning | Analysis | Weather History | etc |

Hardware Summary

<table>
<thead>
<tr>
<th>Triple Play</th>
<th>Link Status</th>
<th>Service Type</th>
<th>Service State</th>
<th>Provisioning Summary</th>
<th>Rate Mode</th>
<th>Service Mode</th>
<th>Line Type</th>
<th>Analysis</th>
<th>Weather History</th>
<th>etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-09-10 09:41 CDT</td>
<td>up</td>
<td>ADSL2+</td>
<td>In Service</td>
<td>DN</td>
<td>19739 Kbps</td>
<td>892 Kbps</td>
<td>Max SNR</td>
<td>16.0 dB</td>
<td>16.0 dB</td>
<td>etc</td>
</tr>
<tr>
<td>10.260.201.155, Slot 1 Port 1</td>
<td></td>
<td></td>
<td></td>
<td>UP</td>
<td>548 Kbps</td>
<td>15.5 dB</td>
<td>Target SNR</td>
<td>9.0 dB</td>
<td>9.0 dB</td>
<td>etc</td>
</tr>
<tr>
<td>1187100.2</td>
<td></td>
<td></td>
<td></td>
<td>Current Rate</td>
<td>9.0 dB</td>
<td>11.3 dB</td>
<td>Min SNR</td>
<td>0.0 dB</td>
<td>0.0 dB</td>
<td>etc</td>
</tr>
<tr>
<td>Combo A+</td>
<td></td>
<td></td>
<td></td>
<td>Max Attain Rate</td>
<td>18.3 dB</td>
<td>19.3 dB</td>
<td>Max TX Rate</td>
<td>21.9840 Kbps</td>
<td>32.0 Kbps</td>
<td>etc</td>
</tr>
<tr>
<td>00:09:00:00:00:00</td>
<td></td>
<td></td>
<td></td>
<td>Max Current Rate</td>
<td>19.3 dB</td>
<td>19.3 dB</td>
<td>Max Delay</td>
<td>16 ms</td>
<td>16 ms</td>
<td>etc</td>
</tr>
<tr>
<td>0:10:16:9</td>
<td></td>
<td></td>
<td></td>
<td>SNR Margin</td>
<td>9.0 dB</td>
<td>11.3 dB</td>
<td>Min TX Rate</td>
<td>32.0 Kbps</td>
<td>32.0 Kbps</td>
<td>etc</td>
</tr>
<tr>
<td>92 days, 12 hours, 52 mins, 19 secs</td>
<td></td>
<td></td>
<td></td>
<td>Loops Attacked</td>
<td>193.4 dB</td>
<td>193.4 dB</td>
<td>Min Delay</td>
<td>16 ms</td>
<td>16 ms</td>
<td>etc</td>
</tr>
<tr>
<td>2569638000</td>
<td></td>
<td></td>
<td></td>
<td>Actual Delay</td>
<td>6 ms</td>
<td>9 ms</td>
<td>Min SNR</td>
<td>0.0 dB</td>
<td>0.0 dB</td>
<td>etc</td>
</tr>
</tbody>
</table>

Status Summary

- Layer 1 through service layer analysis
- Simple and detail views in one screen
- Easily stored, transmitted via e-mail and/or northbound interface
- Any service, any technology

Advanced Detail

Welcome back System Administrator

Status: On
Test Summary: On
Advanced Detail: On
PM Data: On
MLT: On
Map: On
Email Report: Off
Actual Customer Circuit

Before ServiceCheck Analyzed Circuit – to many Errored Seconds

4 Minutes later – and one option change recommended by ServiceCheck
Profiles offered based on equipment selected
Simplified end to end service creation, reduces time to revenue
Service Profiles may be defined, queried and applied in the same GUI.
Point and Click Service Activation

Simplified end to end service creation, reduces time to revenue
Simplified Service Activation

Provisioning options pre-populated
• Provisioning options offered in drop downs
Service Detailed View

Services details queried and modified via common GUI
Single GUI interface supports:
• Multi-layer display (Infrastructure/physical, Mapping, Optical, Transport and Service Layers)
• Traffic Optimization
• Network Planning
• Optical Planning
Total Access EMS-Lite

• Streamlined services deployment via applications based management (plug and play, EZ provisioning)
• User friendly advanced testing and troubleshooting capabilities
• Package includes:
  EMS Application Software for Windows hardware
  Documentation for Windows server hardware
  20 TA5000 licenses
  5000 FTTP ONTs licenses
  Maintenance for 1 year (tech support, software upgrades and patches)
  (Package does not include: TL1 NB GW, TL1 GW documentation and does not support redundancy)
• OSS integration option via integrated TL1 Gateway (future)

COMPELLING PRICE IMPROVES TIME TO MARKET
<table>
<thead>
<tr>
<th>ADTRAN Management Offerings</th>
<th>Feature Summary</th>
<th>HW compatibility and Options</th>
<th>Target Markets</th>
<th>Current Release</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMS-lite</strong></td>
<td>- Full FCAPS support&lt;br&gt;- Centralized Management&lt;br&gt;- Streamlined services deployment&lt;br&gt;- Automated firmware upgrades&lt;br&gt;- Disaster recovery&lt;br&gt;- Testing and Troubleshooting</td>
<td>- Windows XP or Vista servers supported&lt;br&gt;- Device licenses built in&lt;br&gt;- Maintenance for 1 year&lt;br&gt;- Maintenance renewable&lt;br&gt;- Upgradable to standard EMS</td>
<td>Tier 3 Broadband service providers</td>
<td>B07SP1</td>
</tr>
<tr>
<td><strong>EMS on Windows</strong></td>
<td>- Full FCAPS support&lt;br&gt;- Centralized Management&lt;br&gt;- Streamlined services deployment&lt;br&gt;- Automated firmware upgrades&lt;br&gt;- Disaster recovery&lt;br&gt;- Testing and Troubleshooting</td>
<td>- Windows XP or Vista servers supported&lt;br&gt;- Device licenses limited due to hardware capacity&lt;br&gt;- No TL1 GW support (planned for 11/15/10)&lt;br&gt;- No server redundancy</td>
<td>Small Tier 2 and 3 service providers</td>
<td>B07SP1</td>
</tr>
<tr>
<td><strong>EMS on SUN * Sparc CPU servers</strong></td>
<td>- Full FCAPS support&lt;br&gt;- Centralized Management&lt;br&gt;- Streamlined services deployment&lt;br&gt;- Automated firmware upgrades&lt;br&gt;- Disaster recovery&lt;br&gt;- Testing and Troubleshooting&lt;br&gt;- Automated provisioning&lt;br&gt;- Server Redundancy</td>
<td>- Compatible with SUN Sparc CPU&lt;br&gt;- Configurable Device Licenses&lt;br&gt;- Supports large networks&lt;br&gt;- TL1 GW (optional) for automated provisioning&lt;br&gt;- Server Redundancy supported (optional)</td>
<td>Global, all markets</td>
<td>B07SP1</td>
</tr>
<tr>
<td><strong>AOE</strong></td>
<td>- Service oriented management environment&lt;br&gt;- Simplified network wide service activation and assurance&lt;br&gt;- Expert System logic guides operational actions&lt;br&gt;- Simplified OSS integration</td>
<td>- Enhancements to EMS capabilities&lt;br&gt;- Compatible with all above offerings</td>
<td>Global, all markets</td>
<td>AOE1</td>
</tr>
</tbody>
</table>
• Total Access 5000
  – Frame Relay - GUI support
  – GPON enhancements
    • ONT service pre-provisioning
  – ATMoE – GW support
  – Bonded VDSL – GW support
  – ADSL PTM bonding – GW support
  – VDSL2 – ANFP provisioning
  – Enhanced PM reporting
  – SHDSL repeater support
  – MAC viewer

• NV Series - NV8044M

• AOE2
  – BB Activation – GPON/AE
  – Bandwidth Monitor/Capacity management for uplinks: GigE and DS3 EFM
  – WebForms – Config, Status, Provisioning, PM and Test access to all supported devices
  – OPTI 6100 Services access
• Total Access 5000
  • Support for SR6.0
  • SNMPv3 – SCM
  • IPv6 – traffic and system management

• Total Access 11/12xx
  • Support for OSP SR4.0

• NetVanta Series – ongoing
  • NV8044M

• Packet Optical Networking Solution

• AOE3
  – ServiceCheck - Broadband testing, diagnostics and prequalification
  – Topology based FCAPS support
  – Point and click provisioning
    • TriplePlay/BB service activation
  – nCommand MSP
  – Advanced Inventory – external DB integration

• Streamlined OSS integration
  – TMF XML NB Interface

• Linux Operating System
### Integrated Management Roadmap

#### 2010
- **EMS Support:**
  - Bulk Stats (TA5K ADSL2+)
  - Foreign language/character support
  - Total Access 5000 SR5.1, 5.5 and 5.7
    - TSCAN enhancements and ERTSCAN
  - NV800 and 8000 series
    - NV8044/M
  - OSP DSLAM SR2.2.3 & 3.x
    - TA1248A-DMT
    - TA1108VP
  - OPTI-6100 SR5.2T & 5.4
  - MX408e
  - Ethernet over Fiber
  - Triple Play/BB Troubleshooting and PM
- **ADTRAN Operational Environment**
  - Integrated Web Interface
  - ServiceCheck - Integrated testing, diagnostics and prequalification (eTScan)
  - Capacity Management
  - Point and click provisioning
    - OPTI-6100
    - Triple Play/BB service Activation

#### 2011
- **EMS Support:**
  - TA5K/NV SR 5.8 and 6.0 (IPv6)
  - OSP DSLAM SR4.0
  - Next Gen. Optical Systems
- **ADTRAN Operational Environment**
  - End-user visibility to SLA and carrier Ethernet services performance data (Y.1731)
  - Performance Monitoring
    - Bulk Stats (DS3, VDSL)
    - Voice/Data Quality Management
  - Service Topologies (Fault/Prov.)
    - TriplePlay/BB, EoX
    - Next Gen. Optical
    - ERPS (RPR)
  - nCommand MSP
  - External DB integration
- **Streamlined network management solution**
  - PM trending and predictor
  - Contextual help
  - Total Access 5000 integrated configurator
- **OSS integration**
  - TMF standards XML NB Interface
    - macro support
- **Hardware Support**
  - Linux/RedHat
  - Windows 2008 Server
  - Virtual Machines

#### 2012
- **Improved Network Management capabilities**
  - Enhanced PM graphing and alarm correlation tools (zoom)
  - Fault analysis – correlation and topology
  - Traffic and usage analysis, graph of trends, prediction of troubles and recommendations for network changes
- **Network Planning Tool**
- **Optical Planning Tool**
- **User customized GUI screens**
  - Configuration/Provisioning
  - Fault Isolation and troubleshooting
  - Performance monitoring and trending
- **ADTRAN Operational Environment**
  - Topology based FCAPS support
    - Total Access 5000
    - Next Generation Optical Systems
Network Management Summary

- Enhanced service activation, service assurance, and decision support for troubleshooting
- Automated service activations and troubleshooting services through OSS integration
- Improved network planning and performance assurance for demanding applications and service offerings
- Reduced customer OPEX and CAPEX through integrated circuit acceptance and troubleshooting tools
- Leverages best in class tools to provide a complete service management solution in a multivendor environment

*Intelligent Service Delivery Platform Improves Time to Market*
Question and Answers
Backup Slides
Provides a single GUI enabling complete broadband services provisioning

Profiles (config files) simplifies provisioning and reduces errors

Following the completion of all the required provisioning by confirming with the ‘Apply’ button the provisioning scripts will be run (as required), provisioning the services on the ONT
Automated Provisioning

- Supported by Total Access EMS NB TL1 GW
- API is a guaranteed interface by ADTRAN
- Provides a northbound interface for flow-through provisioning from OSS
- Retrieves PM, Status and inventory information
- Provisioning facilitated through templates/profiles

SAMPLE TL1
ED-SHDSL:HSVEOCU5K:SHDSL-1-1-1-1:108::PORTID=CUSt1334-1,RATEMODE=WADAPT,WTARM=20:IS;
ED-SHDSL:HSVEOCU5K:SHDSL-1-1-2-1:110::PORTID=CUSt1334-3,RATEMODE=WADAPT,WTARM=20:IS;
ED-SHDSL:HSVEOCU5K:SHDSL-1-1-2-2:111::PORTID=CUSt1334-4,RATEMODE=WADAPT,WTARM=20:IS;
STA-CMDSSN:CUSt1334:112;
ENT-MEF:CUSt1334:CUSt1334.data:113::UNI=ETH1,STAG=1200,MAPPEDPR=3,PRESERVECTAG=N,PROFNM=2MDATA,PROFCIR=2000,UNTAGGED=Y;