Application of Next Generation Telecom Network Management Architecture to Satellite Ground Systems

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Date: March 2nd, 2005
Agenda

• Background
  – Network Management Systems (NMS) – Where do they fit?
  – Telecom Network Management Vs Satellite Ground System Monitoring
  – Legacy Based NMS - Architecture pitfalls
  – Next Generation NMS - Architecture Attributes

• Motivation

• Wipro Contributions – Next Gen NMS technologies
  – J2EE-based Satellite Ground Monitoring System Architecture - Proof of Concept

• Need for Mediation

• Generic Mediation Framework
  – Architecture Details
  – Benefits

• Conclusion
Network Management Systems (NMS) – Where do they fit?

- **Fault Management**
  - Alarm handling, Trouble Detection, Trouble Correction, Test and Acceptance, Network Recovery, Alarm Forwarding, Filtering, Log Management, Diagnostic

- **Configuration Management**
  - System turn-up, Provisioning, Auto discovery, Backup and restore, database handling, Inventory Management

- **Accounting Management**
  - Track service Usage, Bill record management, Service level agreement

- **Performance Management**
  - Data collection, report generation, Data analysis, Performance monitoring

- **Security Management**
  - Control NE access, Enable NE functions, Access logs
TMN Systems Vs Satellite Ground Monitoring System

Drawing Parallels

IP LAN/WAN

Telecom Management Network System

Network Elements

EMS A

EMS B

Downlink Station

Uplink station

IP LAN/WAN

Central Processing Subsystem

TT&C

Satellite Ground Earth Station

Telemetry Commands

uplink

downlink
Legacy NMS – Architecture Pitfalls

- Monolithic Architecture
- Platform Dependent
- Low Extensibility
- Not Scalable
- GUI Development - complex
- Difficult to maintain the code
Next Gen NMS - Architecture Attributes

• Portable – Platform independent
• Low Coupling and High Cohesion
• Improved Performance / Scalability – Utilize backend processing of application server
• Automatically maintain accurate and up-to-date client applications
• Software caching on client platforms to optimize GUI performance
Motivation

- Share Next Gen Network Management Architecture best practices in Telecom Networks for usage in Satellite ground monitoring system
J2EE-based Satellite Ground Monitoring System
- Architectural PoC

Client Application

Command

Event I/F

RMI / IIOP

Session Beans

Scheduler
Alarm Handler
Time Manager
Inventory
Log Handler
User Admin
Archive

Database Management Layer (entity beans)

User
Store
Record
Alarm

Mediation

Command Handler

JMS

REQ
RESP
EVENT

Ground Monitoring System Interfaces
Need for Mediation

Wireless
- BTS, BSC, MSC...
- Voice Gateway
- DSL element
- Optical elements

Wireline
- BTS, BSC, MSC...
- Voice Gateway
- DSL element
- Optical elements

Satellite
- VSAT terminals
- Sat Modems
- Sat Receivers
- Ground Equipment

NMS
- HTTP
- XML
- SNMP
- Proprietary
- TL1

EMS Layer
Need for Mediation

Wireless
- BTS, BSC, MSC ...
- Voice Gateway
- DSL element
- Optical elements

Wireline
- DSL element
- Optical elements

Satellite
- VSAT terminals
- Sat Modems
- Sat Receivers
- Ground Equipment

EMS Mediation
- Adaptor
- Adaptor
- Adaptor
- Adaptor

NMS Mediation
- Adaptor
- Adaptor
- Adaptor
- Adaptor

CORA B
Generic Mediation Architecture

- Generic Mediation framework for converting one protocol to another.
- Reduces complexity and efforts in building mediation adaptors.
Mediation Framework: Benefits

- Could be used as a **framework to develop adaptors** for the following requirements:
  - Integration with disparate Network Elements or equipments
- Could be used as **framework for developing mediation layer** for a new Monitoring system

**Technology and Methodology Used**

- Generic Technologies
- JMX (Java Management Extension)
- Protocols like SNMP, TL1, CORBA, RMI
- RDBMS concepts
- XML

**Software Engineering Practices:**
- RUP and UML
- Design Patterns

**Testing Methodologies and Tools:**
- JTest
- Rational Rose
Conclusion

• Distributed Network Management Architecture
  – Significant advantages over legacy systems

• Satellite Ground Monitoring Systems V/s Telecom Network Management System

• Convergence of Technologies / Domains
  – Single EMS and NMS
  – Need for Mediation Adaptors

• Generic architecture for Mediation Adaptors based on Normalization of data
Thank you for your time