Best Practices for Developing and Implementing the Right Monitoring Framework

Next-Generation Network Operations Center

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AGENDA:

• Challenges
• Expanding List of Services & Tools for NOC Support
• “Virtualization” Impact – Networks & Infrastructure
• Software-defined Infrastructure / Internet connectivity

• Solution
• Next-Gen NOC - Define the Services and Set SLAs
• Build an Operations Plan to Meet the Service Expectations
• Tools to Include “IoT” & “Virtualization”
• Runbook
• Staffing for Growing Services

• Options
• Buy, Rent or “As-a-Service”

• Summary
REMOTE MONITORING & CONTROL 2014 GOAL:

Cover the latest advancements for monitoring and managing distributed equipment and facilities via recent developments:

- SCADA / HMI, Open Source and Cloud Services
- SDN / Virtualization, Public and Private
- IoT “The Internet of Things”
- M2M and Technology for the Management of Remote Assets
- Remote Networks (Wireless and Wired)
- “Big Data / RMCS” and Related Tools
- Software-defined Networks / solutions
- Reliability, On-site and Back-up Power
- Disaster Recovery and Remote Monitoring
- Security (Cyber and Physical)
EVER EXPANDING LIST OF SERVICES:

- IT Infrastructure
- Network
- Security
- Building Security / Facilities Management
- Business Services
- Data Center (Storage & Processing)
- Telephony
- Software Collection / Processing
- Remotes
- Software Control
- Business Services
- Network Security
- IT Infrastructure

Software-defined Network
ADD “IOT” & CLOUD SERVICE OPTIONS:

- Data Collection / Processing
- Software Control
- Business Services
- Telephony
- Data Center (Storage & Processing)
- Network Security
- IT Infrastructure

Remotes

Software-defined Network

Add "IOT" & Cloud Service Options:
Challenge – Manage Migration from Legacy to IP, to IoT / Cloud

- SMART GRID (Wireless WAN & Home Networks) IP Device Mgt (0,000’s)
- AMI (Wireless & Fiber WAN) IP Device Mgt (0,000’s)
- Substation & Dist. Mgt (SCADA TDM to IP migration) (00’s)
- Data & Voice Services and Backhaul IP Device Mgt (00’s)
- Facilities Management
- Tier 2/3
- IP Network
- INOC Tier 1
- Site Support
- Carrier Support
- Data Center (Storage & Processing)
- Data Collection / Processing
- Business Services
- Telephony
- IP Edge
- TDM Network (Legacy)
- IP Edge
- IP Edge
- IP Edge
- NID
- NID
- NID
- Mgt
- Tier 2/3
- Client Adv Suppt
- Tier 2/3
- INOC
- IP
- WAN
- WAN
- WAN
- WAN
- WAN
Best Practices Solution

Next-Gen NOC - Define the Services and Set SLAs

- Goals - Plans to Meet the Service Expectations
- Machines - Tools to include Virtualization
- Methods - Runbook
- People - Staffing for Growing Services
Service Level Agreement (SLA) Metrics:

- Network – Uptime / Throughput / RFC
- Services - Availability / Capacity / RFCs
- Data Storage & Computing – Speed / Completion
- Power – Availability / Reliability / RFCs
- Environmental Control – Compliance
- Facility Secure Access – Compliance
- Cross-Connect – Uptime / RFC
- *RFC (Request for Change – Add, Move and Delete)
Meeting SLA Requirements – Best Practices

- 24x7 Service Desk – Available to Monitor Alarms, Handle Calls and Manage / Document Incidents
- Proactive Support (Infrastructure Monitoring)
- Reactive Support (Notification from Users)

NOC Operations Fundamentals
Operations Plan to Meet SLAs

24x7 Reactive Support

24x7 Proactive Support

NOC Resolution:
- Correlate Related Events
- Troubleshoot / Escalate
- Dispatch
- Resolve
- Document

Advanced Support, Problem & Capacity Mgt.
Solution Elements for Virtual Services

- **Tools** – Monitoring, Workflow, Documentation and Reporting (Expanded for IoT / Virtualization)
- **Process** – Best-in-Class (ITIL) / Focus on SLAs
- **People** – Skill Set to Match Functional Requirements (Expanded for IoT / Virtualization)
- Integration of Tools and Process-based on SLA Requirements – In-house Experts or Consultants
Tools – Monitoring, Workflow Documentation and Reporting

• EMS / NMS / SMS – Alarm Aggregation from all Infrastructure Systems

• Workflow Management / Ticketing System with Time-stamp as Work progresses or Escalation if Work is Delayed

• Portal / Web Access for Customer Access to their Information
Integration of Tools for Network / Application / Service Monitoring

<table>
<thead>
<tr>
<th>To Be Monitored</th>
<th>Tools Available</th>
</tr>
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<tbody>
<tr>
<td>Network / Security</td>
<td>Off-the-Shelf / Custom OSI</td>
</tr>
<tr>
<td>Applications</td>
<td>Off-the-Shelf / Custom OSI</td>
</tr>
<tr>
<td>Data Storage / Process</td>
<td>Off-the-Shelf / Custom OSI</td>
</tr>
<tr>
<td>Services / Transactions</td>
<td>Custom OSI / Off-the-Shelf</td>
</tr>
<tr>
<td>Business Services</td>
<td>Custom OSI / Off-the-Shelf (with Integration)</td>
</tr>
<tr>
<td>Virtualization (Services and Infrastructure)</td>
<td><strong>SMS</strong> / Custom OSI / Off-the-Shelf (with Integration)**</td>
</tr>
</tbody>
</table>
OSI-based tools

OpenControl SCADA Network Architecture
Example: “Off-the-Shelf” Monitoring System
Example: “Off-the-Shelf” Monitoring Systems
Tools Integration into a “Single Pane of Glass”

NOC Monitoring System (Alarm Aggregation)

Secure Connection

Cloud Storage & Processing

EMS / NMS

Environmental Systems

Network & Security Systems

Power Management

Storage / Processing (Includes Application & Service Monitoring)

SMS

SCADA

Business Services

Monitoring System to Aggregate ALL Alarms via “MoM”
Best Practices – the Basics

Escalation

Expected Result?

Input

Processing Work Instruction

Out

YES

Next Step

NO
Process (ITIL) – Documented, Standards-based and Focus on SLA Fulfillment

- Process Flow Mapping
- Work Instructions for Every Process
- Expected Results
- Escalation
- Dispatch
- Closure and Documentation
- Reporting

- Real Need for Best-in-class Process Development
Starting Point - Proactive “Alarm to Action” Guide

- Every Alarm Documented in the Runbook
  - Description
  - Impact
  - Next Steps
- Alarm Correlation Steps
  - Related Devices / Network / Services
- Impact Assessment / Prioritization
  - Based on Scope of Incident and Impact on Business Services
- Troubleshooting Inputs
  - Initial Data Collections Documented and Available
Knowledge Base / Runbook

- Documentation of all Business Aspects
- Architecture
- Organization
- Process Flow
- Work Instructions
- Contingencies
- Business Continuity Plan
Staffing – Skill Set to Match Functional Requirements

- Architect / Engineers / SMEs
- Deployment / Support Engineers
- Service Desk
- Tier 1 Support
- Advanced Support

Staffing Limitations:
- Budget Constraints
- Staff Additions Often Lag Growth
- Multiple Responsibilities - Staff for Highest Job Requirements
Options for NOC Support

Buy, Rent or “As-a-Service”:

- Tools – Off-the-Shelf, Open Source or “As-a-Service”
- Process – Develop, Buy or As-a-Service
- Staffing – Hire, Contract or As-a-Service
Survey of NOC Activity

Structured NOC Solution:
- Tiered Jobs
- Resource Pool
- Maintain Focus
- Meet SLAs
- Control Costs
- “Right-Sized” Solution

<table>
<thead>
<tr>
<th>ACTIVITY TYPE BY TIER:</th>
<th>Tier 1</th>
<th>Tier 2/3</th>
</tr>
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<tbody>
<tr>
<td>PERIODIC REVIEW</td>
<td>3%</td>
<td>10%</td>
</tr>
<tr>
<td>DOCUMENTATION</td>
<td>2%</td>
<td>3%</td>
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<tr>
<td>INCIDENT MANAGEMENT</td>
<td>7%</td>
<td>18%</td>
</tr>
<tr>
<td>24x7 EVENT MONITORING</td>
<td>39%</td>
<td></td>
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<tr>
<td>CALLS/E-MAILS</td>
<td>14%</td>
<td>4%</td>
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</tbody>
</table>
Options for Operations

- **Tools – Buy, “Rent” or As-a-Service**
  - Off-the-Shelf, Require Customization and Support
  - Web-based, Require Customization
  - As-a-Service may Include Customization

- **Process – Develop, “Buy” or As-a-Service**
  - Is the Essence of the Operations, Must be Fully Engaged Regardless of Source

- **Personnel – Hire, Contract or As-a-Service**
  - Direct-hire Provides Most Control
  - Contractors Provide Flexibility
## Outsourced NOC Comparison

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>Internal Annual</th>
<th>Internal One Time</th>
<th>Outsource Annual</th>
<th>Outsource One Time</th>
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<tbody>
<tr>
<td>Service Cost</td>
<td>$0</td>
<td>$0</td>
<td>$216,000</td>
<td>$15,000</td>
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<tr>
<td>Tools</td>
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<td>$275,000</td>
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<tr>
<td>Tools Supt</td>
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<td>$35,000</td>
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<tr>
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<td>$0</td>
<td>$115,000</td>
<td>$0</td>
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<tr>
<td>Office Eqt</td>
<td>$2,000</td>
<td>$20,000</td>
<td>$500</td>
<td>$5000</td>
</tr>
<tr>
<td>Total Yr 1</td>
<td>$469,000</td>
<td>$335,000</td>
<td>$331,500</td>
<td>$55,000</td>
</tr>
</tbody>
</table>

- **$804,000 Yr 1**
- **$469,000 Yr 2 – 5**
- **$2,680,000 Total**

- **$386,500 Yr 1**
- **$331,500 Yr 2 – 5**
- **$1,712,500**
Summary of Best Practices

• Define Business Objectives and Identify SLAs for Success
• Architecture Includes IoT / Cloud / Virtualization + Contingencies
• Tools
  • Take Advantage of Monitoring Capabilities being Deployed
  • Integrate into a “Single Pane of Glass”
• Process
  • Map Processes to Meet the SLA requirements
  • Alarm to Action Guide – Heart of Proactive Support
  • Comprehensive Runbook and all Work Instructions
• People
  • Map Skill Sets for Staffing Requirements
  • Use Combination of Internal, Contract and Outsourcing as Needed
• Own the Strategic Initiatives and Planning, Even if Outsourced
Questions?

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