Transforming Raw Data to Profitable Intelligence in Mobile Networks

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Mobile Voice Conference
March 2014
Agenda

- Growth of Mobile Data
- Data Value Chain Contribution to Data Growth
- Signal from the Noise: Organizing Data Intelligently
- Mobile KPI Classes and Examples
- Intelligence Continuum and SOC KI Data Design
- Use Case: SOC and VoLTE Service Assurance
Mobile Data Is Growing

Global Mobile Data Traffic Growth / Top-Line
Global Mobile Data Traffic will increase 13X from 2012 to 2017

Average Mobile User; Traffic per Month

Machine-to-Machine Mobile Data Traffic Growth
M2M Data Traffic will increase 31X from 2012 to 2017

Global Mobile Data Traffic Growth / Apps
Video to Exceed 66 Percent of Mobile Data Traffic by 2017

Source: Cisco Visual Networking Index (VNI) Global Mobile Data Traffic Forecast, 2012–2017
Data Value Chain

Near Real Time KPI/KQI/Enriched Data Analysis

BI and DW

Enriched Data, Proactive, Heuristic Based Analytics

Value of an Individual Data Item

Value of Data in Aggregate

Application Complexity

Data Age

Interactive
Real time Analytics
Record Lookup
Historical Analytics
Exploratory Analytics
Analytic

Transactional

Source: VoltDB, Inc.
How to Transform Raw Data to Profitable Intelligence in Mobile Networks?

- Need to find the Signal from the Noise (Nate Silver)
- Tackle the problem from a Service Operation Center (SOC) approach (KPI -> KBO), where the “Subscriber” and “Service” is the focus to start because that affects profitability, ROI and growth
- Intelligently organize, aggregate, threshold, alert, filter and visualize data accordingly, leveraging the Data Value Chain
- Incorporate various type of data, including business data for example as part of your enrichment and correlation strategy
End-End Mobile Customer Service Experience
Four KPI Classes

- Network Availability
- Service Accessibility
- Service Retainability
- Service Performance Integrity

Can Subscriber Access Network
Can Subscriber Access Services
Can Subscriber Retain Service as they move physical locations
Service Quality Metrics Subscriber receives or experiences
Network Availability LTE KPI Examples

- **Network Availability** – can the subscriber attach to the network (successful registration and authentication)
  - Network Attach Success Rate - looks at the subscriber network attach requests and determines successful requests vs. failures
  - Registration by Cell ID - combines both network attach and authentication success, by cell id (location)
  - Attach Failures by Cause – similar to Network Attach Success Rate but for failures, determines the actual failure cause code (i.e. network unavailable, subscriber not authorised etc.)
  - Authentication Success Rate - determines whether the subscriber is actually provisioned correctly to utilise the network and services. Determines successful authentication requests vs. failures
Service Accessibility LTE KPI Examples

- **Service Accessibility** – once attached, can the subscriber successfully access a specific service

  - **Service Request Success Rate** - this determines whether network resources are available wrt. the subscribers location and authorization when a service is requested. Service request volume vs failures or rejects

  - **Volume of Sessions in the Active state** - once session is set up (i.e. bearer has been assigned and there is service or packet flow), determine those services or bearers active vs. idle

  - **Bearer Allocation Reject Reason Distribution (by APN, by Cause)** - when bearer requests fail, determines the cause (i.e. resources not available etc.) Also include APN associated with service being requested
Service Retainability LTE KPI Examples

- **Service Retainability** – can the subscriber retain or maintain service continuity as they roam

  - **Tracking Area Update (TAU) Success Rate** - TAU is associated with a Mobility Management Entity (MME) in LTE. Determines success rate of whether a subscriber is roaming out of a MME serving area and into another

  - **Home Subscriber Server (HSS) Update Location Success Rate** - when a subscribers changes location an update request is sent to the HSS. Looks at requests vs failures

  - **Inter-RAT Incoming, Outgoing Handover Success Rate 4G to 3G, 3G to 4G** – when the subscriber roams out of say 4G coverage into 3G, even if they are not actually using a service at the time, device will go through the required access network hand over (HO). Looks at HO requests vs failures
Service Performance Integrity LTE KPI Examples

- **Service Integrity** – actual subscriber service experience
  - Bytes UL/DL - bytes associated with the service packet flow
  - Packet Loss Ratio – packets lost vs total
  - Retransmitted DL/UL % - retransmitted packets due to packet loss
  - URL Analysis – packet flow analysis by URL
  - User Agent Analysis - for every http service request, the device send a user agent which contains the device manufacturer, model and OS type etc. Often used to determine device incompatibility with the service being requested
  - Service Type e.g. P2P, HTTP, Secure HTTP, Email
  - Application (via DPI and enrichment) e.g. Skype, Facebook
Intelligence Continuum

Wisdom

Use knowledge to establish and achieve goals/ROI

Knowledge

Analyze & synthesize derived information

Information

Give meaning to obtained data

Data

Obtain the raw facts

Baker’s depiction of the Knowledge Continuum, 2007
Service Operation Centre (SOC) KI Design

Dashboard & Analytics

KBOs
- T2R Reduction
- Service Revenue Growth
- Customer Retention

KBIs
- Service Revenue Growth
- Retention Customer Analysis
- APM over Mobile Traffic

Mediation & Correlation

KQIs
- Voice Service Quality
- Network Accessibility
- VIP SLA Quality Scores

Data Capture

KPIs
- Uplink/Downlink Speeds
- MOS
- Packet Errors/ Packet Loss
Use Case
Managed Service Provider (MSP) Problem

- A leading MSP in Asia has introduced HD Voice (VoLTE) to a select number of Corporate Customers (VIPs). Promoting this as delivering unrivalled quality and so customer experience, network wide…

- Voice quality is indeed good, but some of the customers/ VIPs begin to complain that calls in progress are being dropped while they are in transit i.e. as they move from location to location within the network.

- Trouble tickets are raised and then sent to the NOC to resolve. After investigation, existing Network Operations tools indicate that VoLTE calls are indeed being dropped. But the NOC personnel cannot determine which customers/ VIP are being effected and why…
SOC Use Case – VoLTE Service Assurance

Solution

- Working with the MSP, design a Customer centric, SOC focused dashboard specific to VoLTE service, delivering on a KBO of retaining key customers/ VIPs.

- By implementing the SOC approach, the MSP is able to deliver on its KBO by getting immediate (real-time) visibility of those customers / VIPs experiencing poor VoLTE service.

- The solution also enables the MSP to troubleshoot VoLTE issues at an individual subscriber level, and in this case, determine that the problem is actually related to a specific handset manufacturer, thus preventing further customer/ VIP dissatisfaction while enabling better vendor management...
SOC Use Case – VoLTE Service Assurance

- KBO: Customer Retention
- KBI: Retention Customer Analysis
- KQI: Voice Service Quality + VIP SLA Quality Scores
- KPI: Uplink/Download Speeds + Mean Opinion Score (MOS) + Packet Errors/Packet Loss
SOC Use Case – VoLTE Service Assurance

- **Control Plane KPI Classes**: Availability, Accessibility and Retainability
- For LTE, looking at S1AP, S5/ S8, S6a and SGs for control plane
- **User Plane KPI Class**: Performance Integrity
- For LTE, looking at S1-U for user plane

Source: iteworld.org
Empirix. Mastering Complexity.