“PARIS” VoIP-Monitoring

Reasons and solutions for automated VoIP Blackbox- and Longterm-Monitoring at the Telekom Austria Group

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Overview

1. Reasons for Longterm Blackbox Monitoring
2. Realization of Monitoring Infrastructure
3. Findings

PARIS
Performance, Availability and Reliability Information System
Longterm Monitoring – Visual Representation of Signaling Delay

Figure 1: Upcoming system failure – monitored Call Setup Delay
Longterm Monitoring – Visual Representation of RTP - KPIs

- Jitter distributed over daytime ⇒ blackboxed RTP-proxy load monitoring
- End2End Latency distribution
- Packet loss monitoring

Figure 2a-c: RTP Analysis: Jitter, Latency and Packet Loss

- **Call-by-Call** Jitter and Latency monitoring

Figure 3a and b: automatic RTP Analysis: Jitter and Latency of one single testcall
Reasons for own Blackbox Monitoring solution

Some interesting monitoring products available on the market, like Empirix, “IPTEGO Paladin”, etc.

- Costs
- Heterogeneous Network – no common monitoring interface
- Different hardware vendors from different “universes” – Telco vs. Internet
- Geographical and organizational hardware dislocation
- Agile Development
Objectives for Blackbox Monitoring Solution

- "User perspective"
- "Continuous Monitoring"
- "Robust realtime Alerting"
- "Longterm monitoring"
- "Flexible configurable and extendable"
- "Applicable to all types of VoIP infrastructures and providers"
- "Offered as a Service"

Figure 4: RTP Jitter distribution during one week
Realization

Four **use cases** for blackbox monitoring

1. SIP to SIP Call originated from PARIS-host
2. SIP to CS/ISUP Call originated from PARIS-host
3. SIP to SIP Call originated from deployed host
4. SIP to CS/ISUP Call originated from deployed host

**Targets free definable**

- Only Credentials needed
- Client acts RFC3261 and IMS compliant

**Time triggered** call initiation

**Length** of Voice Call and Codec **free definable**

Clients implemented on Unix infrastructure

    even on embedded devices
PARIS v1.1 – use case 1/4

SIP to SIP calls
PARIS v1.1 – use case 2/4

SIP2CS breakout calls
PARIS v1.1 – use case 3/4

long distance solution, resp. customer located (in development)
PARIS v1.1 – use case 4/4

long distance solution, resp. customer located against CS callee (in development)
**PARIS v1.1 - Call and Analyzing Logic**

1. Start network- and application-layer tracing
2. Register the user agent
3. Initiate the call (INVITE, MESSAGE, …)
4. Un-Register the user agent
5. Stop network- and application-layer tracing
6. Analyze response-codes (Successful/Non-successful)
7. Analyze application-layer logs and calculate RFC 6076-values
8. RTP Analysis (ITU P.862, etc.)
Processing Results – Nagios® Alerts

Test results seamless integrable in existing Nagios infrastructure

Alerting can be triggered on

- Testcall succeeded or not?
- Aggregation of multiple testcalls
- Signaling Delay above threshold?

Figure 5: Nagios States of one monitored Core Infrastructure, 15/02/2011
Processing Results – Online presentation

Figure 6: Online presentation of continuous quality measurements over one monitored week.
### 4.3.1. Successful Session Setup - Session Request Delay (SSS-SRD)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Sample</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>8530</td>
<td>1101.889 ms</td>
<td>1039.235 ms</td>
<td>939.936 ms</td>
<td>15197.343 ms</td>
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</tbody>
</table>

### 4.3.2. Failed Session Setup - Session Request Delay (FSS-SRD)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Sample</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>8614</td>
<td>200.203 ms</td>
<td>152.973 ms</td>
<td>17.462 ms</td>
<td>8169.350 ms</td>
</tr>
</tbody>
</table>

### 4.4.1. Successful Session Completion - Session Disconnect Delay (SSC-SDD)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Sample</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>8520</td>
<td>39.800 ms</td>
<td>17.178 ms</td>
<td>16.914 ms</td>
<td>9195.516 ms</td>
</tr>
</tbody>
</table>

### 4.4.2. Failed Session Completion - Session Disconnect Delay (FSC-SDD)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Sample</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>7</td>
<td>4000.000 ms</td>
<td>4000.000 ms</td>
<td>4000.000 ms</td>
<td>4000.000 ms</td>
</tr>
</tbody>
</table>

### 4.5.1. Successful Session Completion - Session Duration Time (SSC-SDT)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Sample</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>8530</td>
<td>40013.338 ms</td>
<td>40013.159 ms</td>
<td>40011.637 ms</td>
<td>40091.526 ms</td>
</tr>
</tbody>
</table>

### 4.6. Session Establishment Ratio (SER)

51.531%

### 4.7. Session Establishment Effectiveness Ratio (SEER)

96.352%

### 4.8. Ineffective Session Attempts (ISA)

0.131%

### 4.9. Session Completion Ratio (SCR)

95.968%

RFC 6076
Summary

(Longterm) Blackbox-monitoring is essential

• Customer, not Operator perspective
• Provider independent
• Vendor independent
• Trends detectable – failures predictable

"The whole is different from the sum of its parts" (Aristoteles)
Thank you!

Questions?  

Y Answer known?  

N Thank to Audience  

N State that time has run out  

Answer

Thank to Audience

State that time has run out

Leave

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In cooperation with Institute of Telecommunications
Ende der Bildschirmpräsentation. Zum Beenden klicken.
**Facts & Figures A1 Telekom Austria**

<table>
<thead>
<tr>
<th>Establishment of the Company</th>
<th>The &quot;K.K. Post und Telegraphenverwaltung&quot; was founded in 1887. Merger of Telekom Austria and mobilkom austria into A1 Telekom Austria in July 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Structure</td>
<td>Subsidiary of the Telekom Austria Group - leading telecommunications company in the CEE region</td>
</tr>
<tr>
<td>Business Segments</td>
<td>Voice telephony, data &amp; IT solutions including wholesale, Internet access and media as well as a range of solutions for home &amp; office</td>
</tr>
<tr>
<td>Brands</td>
<td><img src="image1" alt="Telekom Austria Logo" />, <img src="image2" alt="A1 Logo" />, <img src="image3" alt="bob Logo" />, <img src="image4" alt="MOBILE Logo" /></td>
</tr>
<tr>
<td>Customers</td>
<td>5.1 million mobile communications customers and 2.3 million customers in the fixed net</td>
</tr>
<tr>
<td>Revenues*</td>
<td>Revenues: EUR 3,064.2 million; EBITDA EUR 1,032.4 million</td>
</tr>
<tr>
<td>Employees*</td>
<td>Approximately 9,700</td>
</tr>
<tr>
<td>Shops</td>
<td>101 Austria-wide</td>
</tr>
</tbody>
</table>

* Annual Results 2010
Corporate Structure Telekom Austria Group

Key Financial Figures FY 2010
Telekom Austria Group

Revenues: € 4,650.8 million
EBITDA: € 1,645.9 million
Employees: 16,501