Service Level Agreement (SLA) and Global QoS index for 3G networks

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Outlook

1. UMTS QoS issues and Service level Agreements
2. Parlay for SLA control
3. Global QoS index
4. “Gold-silver-bronze” QoS standard
5. Best practice. New York experience
6. Best practice. LRAIC approach for penalties
7. Conclusion
1.1 Service Level Agreement

1. Service Level Agreement (SLA) - formal agreement between two or more entities with the scope to
   – assess service characteristics,
   – responsibilities and
   – priorities of every part.

2. SLA may include compensations for an unreached level of quality as an economic issue of the contract.

1.2 Introduction on QoS and SLA studies


   – Fault report for access line per year,
   – Unsuccessful call ratio,
   – Call set up time,
   – Supply time for initial network connection,
   – Percentage of orders completed on or before the date confirmed or contracted with the customer,
   – Response time for operator service,
   – Availability of card or coin operated public pay phones,
   – Fault repair time,
   – Service restoration.

3. ETSI TIPHON project for IP telephony. “Gold-silver-bronze” approach:
   voice packet loss:
   • < .5% for class 1 = gold,
   • .5% to 1% for class 2 = silver,
   • 1% to 2% for class 3 = bronze.
1.3 3GPP QoS Concept and Architecture
(3GPP TS 23.107 V5.1.0)

1.4 Multimedia Services

- Real Time Communications
- Voice
- Text
- Video
- Non-Real Time Communications
  - audio download;
  - video download;
  - audio streaming;
  - video streaming;
  - general data files;
  - text messaging (e.g. SMS);
  - emails;
  - general web browsing;
  - multi-media messaging

3GPP TR 22.941 V0.7.7
3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Based Multimedia Services Framework; Stage 0 (Release 5)
### 1.5 Value ranges for UMTS Bearer Service Attributes

<table>
<thead>
<tr>
<th>Traffic class</th>
<th>Conversational class</th>
<th>Streaming class</th>
<th>Interactive class</th>
<th>Background class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum bitrate (kbps)</td>
<td>&lt; 2 048</td>
<td>&lt; 2 048</td>
<td>&lt; 2 048</td>
<td>&lt; 2 048</td>
</tr>
<tr>
<td>Delivery order</td>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Maximum SDU size (octets)</td>
<td>&lt;=1 500 or 1 502</td>
<td>&lt;=1 500 or 1 502</td>
<td>&lt;=1 500 or 1 502</td>
<td>&lt;=1 500 or 1 502</td>
</tr>
<tr>
<td>SDU format information</td>
<td>RCP protocol</td>
<td>RCP protocol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery of erroneous SDUs</td>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Residual BER</td>
<td>$5 \times 10^{-2}$, $10^{-3}$, $5 \times 10^{-3}$, $10^{-4}$, $10^{-5}$</td>
<td>$5 \times 10^{-2}$, $10^{-3}$, $5 \times 10^{-3}$, $10^{-4}$, $10^{-5}$</td>
<td>$4 \times 10^{-2}$, $10^{-3}$, $6 \times 10^{-4}$</td>
<td>$4 \times 10^{-2}$, $10^{-3}$, $6 \times 10^{-4}$</td>
</tr>
<tr>
<td>SDU error ratio</td>
<td>$10^{-2}$, $2 \times 10^{-2}$, $10^{-3}$, $5 \times 10^{-4}$, $10^{-5}$</td>
<td>$10^{-2}$, $2 \times 10^{-2}$, $10^{-3}$, $5 \times 10^{-4}$, $10^{-5}$</td>
<td>$10^{-2}$, $10^{-3}$, $10^{-4}$, $10^{-5}$</td>
<td>$10^{-2}$, $10^{-3}$, $10^{-4}$</td>
</tr>
<tr>
<td>Transfer delay (ms)</td>
<td>100 – maximum value</td>
<td>250 – maximum value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guaranteed bit rate (kbps)</td>
<td>&lt; 2 048</td>
<td>&lt; 2 048</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic handling priority</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allocation/Retention priority</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
</tr>
</tbody>
</table>

### 1.6 IETF activities and 3GPP

**Quality of Service Enablers**

- IETF Integrated Services (IntServ) and Resource Reservation Protocol (RSVP)
- Differentiated Services (DiffServ)
- Multiprotocol Label Switching (MPLS)

**QoS Management Enablers**

- Service Level Agreements (SLAs)
- Common Open Policy Service (COPS) protocol
- Simple Network Management Protocol (SNMPv3)
1.7 Quality of Service (QoS)

ITU-T: *The collective effort of service performance which determine the degree of satisfaction of a user of the service.*

- **User Domain**
  - Speed
  - Accuracy
  - Dependability
    - Reliability
    - Availability
  - ...

- **Provider Domain**
  - Delay
  - Loss
  - Utilization
  - ...

User QoS Requirements

QoS offered by Provider

QoS Experienced by User

QoS Achieved by User
ERROR: invalidrestore
OFFENDING COMMAND: restore

STACK:
-savlevel-
-savlevel-