QoS in SIP-based NGN – state of the art and new requirements

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Dipl.-Ing. (FH) Frank Weber (weber@e-technik.org)

Fachhochschule Frankfurt am Main – University of Applied Sciences Research group for telecommunication networks Laboratory for telecommunication networks

Kleiststraße 3, 60318 Frankfurt a.M., Germany

Web: www.fh-frankfurt.de/~weberfra www.e-technik.org

Overview

- 1 QoS (Quality of Service) and resource control in SIPbased NGN (Session Initiation Protocol; Next Generation Networks)
- 2 New requirements to QoS management in SIP-based NGN
- 3 New approach: Integrated framework for comprehensive QoS control in NGN
- 4 Conclusion and outlook

1 QoS and resource control in SIP-based NGN



Functional QoS architecture



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Features of NGNs' QoS architecture

- Per-session QoS/resource control for every single media flow between 2 subscribers
- 3 possible modes (push/pull/push-pull mode) for best flexibility and compatibility with standard SIP equipment and UMTS equipment (NGN/IMS convergence)
- Resource allocation/reservation/release has to be signalled to involved transport network elements → high volume of additional traffic for QoS/resource management

Deficiencies of NGNs' QoS architecture

- No. of parallel sessions \uparrow
 - * Resources occupied by user data traffic \uparrow
 - + Resources available \downarrow
 - ∗ Resource management traffic ↑
 - + Resources available \downarrow
- Average media session duration \downarrow
 - * No. of sessions (possible) per period of time ↑
 - + Resource management traffic **↑**
 - Resources available \downarrow
- − → NGNs' QoS/resource control architecture does not scale
- Amount of required resource management traffic depends on (amongst others)
 - * No. of session requests per time per user
 - * Average session duration
- → Amount of QoS/resource control traffic is influenced by factors that are not efficiently controllable by NGN provider

2 New requirements to QoS management in SIP-based NGN

- Functions and mechanisms needed to provide trustworthy QoS for media sessions more efficiently/scalable
- End-to-end QoS and resource control, including access and core networks, and inter-domain QoS negotiation
- Simple and resource saving resource control/management approaches, based on standardised protocols and architectures
- Both, session-based multimedia services and non-session-based services (e.g., email and internet access) should be accessible within the same network.
 NGN's resource control has to be aware of a certain amount of traffic that is not session-based

Further requirements

- Provide resources for a certain number of media streams with certain bandwidth and QoS requirements
- Set up and managed independent of media sessions, has to be controlled by a specific management function
- Independent of underlying transport/QoS technology (such as MPLS, ATM, VLAN)

3 New approach: Integrated framework for comprehensive QoS control in NGN



Integrated framework for comprehensive QoS control in NGN

- QoS negotiation entity
 - * Located at subscriber (CPE) or within provider's access network
 - * SIP for session initiation and QoS negotiation with Call Server
 - * Gate functionality for media streams
- QoS logic and controller
 - * Aware of IP network conditions, also for non-session-based traffic
 - * Aware of session-based traffic (SIP)
 - * Dimensioning and control of virtual data pipes based on algorithms
 - * Assignment of media streams to existing virtual data pipes
 - * Controls gate within QoS negotiation entity
- Virtual data pipes
 - * Virtual "paths" within the transport network, independent of underlying transport/QoS technology
 - * Provide defined bandwidth and QoS conditions, shared by several media streams
 - * Controlled by QoS logic and controller

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4 Conclusion and outlook

- Standardised NGN QoS/resource control architecture lacks of scalability and efficiency
- New requirements defined to NGN QoS/resource control
- New approach: Integrated framework for comprehensive QoS control in NGN
- Future research work will be focussed on the definition and development of mechanisms and algorithms for the new approach's appliance
- Further research needed to prove the new approach's efficiency