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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Quality of service
architecture for audiovisual and multimedia services

A framework for adaptive end-to-end QoS control based on variable bit-rate codecs in wireless networks

Recommendation ITU-T H.362

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Recommendation ITU-T H.362

A framework for adaptive end-to-end QoS control based on variable bit-rate codecs in wireless networks

Summary

Recommendation ITU-T H.362 describes a framework for adaptive end-to-end quality of service (QoS) control using variable bit-rate codecs in wireless networks. Specifically, this Recommendation describes a reference network architecture, functional entities, reference points, a terminal architecture, and signalling flows between functional entities. The framework in this Recommendation can be used for application level QoS support to control the multimedia service quality adaptively in wireless networks where the network status may change over time.

History

Edition	Recommendation	Approval	Study Group
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FOREWORD

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The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

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Recommendation ITU-T H.362

A framework for adaptive end-to-end QoS control based on variable bit-rate codecs in wireless networks

1 Scope

There are various wireless networks including 2G/3G/4G mobile networks, wireless LANs, and mobile WiMAX networks. On the other hand, there are various multi-rate codecs including ITU-T G.729.1, ITU-T G.722.2, and ITU-T H.264, which can provide variable bit rates and adaptability in the dynamic environment where the network status may change over time.

Networks are being evolved toward the converged network where heterogeneous wired/wireless access networks are converged using the IP-based core network. Fixed mobile convergence (FMC) and fixed mobile substitution (FMS) are some examples. In such an environment, many of the QoS control mechanisms are employed in the core/access networks to manage QoS resources efficiently. However, this type of QoS control may not be sufficient to meet the end users' expectation from the end-to-end QoS perspective because QoS control at the application level is not involved. To provide more complete end-to-end QoS, the application level QoS support can be useful. This is particularly important when the network is not able to support QoS. One of the possible application level QoS mechanisms is codec-based QoS control which adjusts encoding parameters such as codec bit rate or codec mode according to the network status, e.g., wireless channel status.

Various codec-based QoS mechanisms were proposed to control the codec bit rate and call capacity using the wireless channel information in diverse wireless networks. However, in the heterogeneous network environment, it is difficult to control QoS in a unified way and to achieve the desirable service quality. Therefore, it is useful to design a common framework to control the codec mode adaptively, according to the channel status in wireless networks and reflect the users' perceived quality. For achieving the objective, this Recommendation describes a framework for adaptive end-to-end QoS control using variable bit-rate codecs in wireless networks. Specifically, this Recommendation describes a reference network architecture, functional entities, references points, a terminal architecture, and signalling flows between functional entities. The stability of control loop and delayed feedback in the control path which may affect the service quality is important in such an adaptive QoS control; however, it is out of scope of this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.711.1] Recommendation ITU-T G.711.1 (2008), *Wideband embedded extension for G.711 pulse code modulation*.
- [ITU-T G.722.2] Recommendation ITU-T G.722.2 (2003), *Wideband coding of speech at around 16 kbit/s using Adaptive Multi-Rate Wideband (AMR-WB)*.
- [ITU-T G.729.1] Recommendation ITU-T G.729.1 (2006), *G.729-based embedded variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729*.

- [ITU-T H.245] Recommendation ITU-T H.245 (2008), *Control protocol for multimedia communication.*
- [ITU-T H.264] Recommendation ITU-T H.264 (2009), *Advanced video coding for generic audiovisual services.*
- [ITU-T H.323 v7] Recommendation ITU-T H.323 (2009), *Packet-based multimedia communications systems.*
- [ITU-T M.2301] Recommendation ITU-T M.2301 (2002), *Performance objectives and procedures for provisioning and maintenance of IP-based networks.*
- [ITU-T Y.1541] Recommendation ITU-T Y.1541 (2006), *Network performance objectives for IP-based services.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation does not use any particular terms defined elsewhere.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 base station (BS): A radio receiver/transmitter that serves as the hub of the wireless access network and connects the wireless stations (WSTAs) to the IP-based network.

3.2.2 codec mode (CM): A specific bit-rate of a variable bit-rate codec.

3.2.3 quality-of-service control function (QCF): A service quality control function capable of managing the codec mode to control the amount of traffic from/to WSTAs or packet transfer characteristics such as delay, loss, and jitter.

3.2.4 variable bit-rate codec (VBRC): A multi-mode codec which can support a set of variable bit rates, e.g., ITU-T G.711.1, ITU-T G.722.2, ITU-T G.729.1, and ITU-T H.264.

3.2.5 wireless station (WSTA): A terminal which provides wireless access to the end user and is equipped with one or more variable bit-rate codec(s).

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

BS	Base Station
CI	Codec Information
CMC	Channel Measurement Command
CMC_REQ	Codec Mode Change Request
CMC_RESP	Codec Mode Change Response
CMCM	Codec Mode Control Module
COCM	Codec Operation Control Module
CQ	Channel Quality
CSMMF	Channel Status Measurement and Management Function
MDP	Multimedia Decoding Parameters
MEP	Multimedia Encoding Parameters