



A Generic Architecture for End-to-End Quality of Service in Heterogeneous Networks

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Agenda

- ❑ Introduction
- ❑ Design Considerations
- ❑ Easy Wireless QoS Architecture Entities
- ❑ QoS Signaling Description
- ❑ Using NSIS for resource reservation signaling
- ❑ Mapping Easy Wireless QoS entities over QoS-NSLP
- ❑ Conclusions

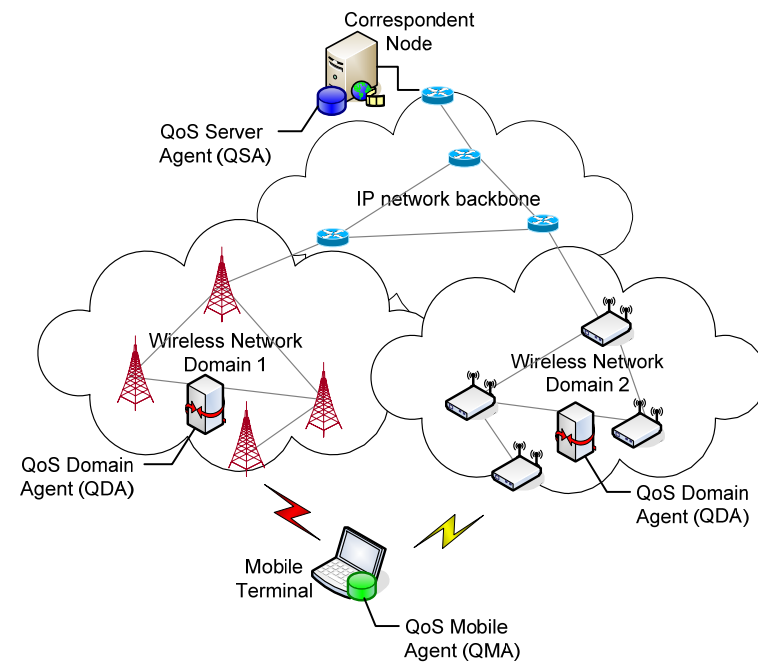
Introduction

- ❑ To introduce a generic architecture that can embrace different solutions to cope with the different issues of the end-to-end QoS within an heterogeneous wireless environment.
- ❑ This architecture has been designed in the context of the Easy Wireless project
 - Its fundamental goal is to allow mobile user traverse seamlessly across a variety of network technologies while maintaining the QoS and service continuity in different application domains.
 - Easy Wireless project is partially funded by the ITEA Project, which is a strategic pan-European programme.
- ❑ Easy Wireless project embraces both QoS and mobility aspects but, in particular, the paper focuses on the QoS architecture proposed in the project
 - QoS solution proposed defines interfaces that can be seen as independent from the mobility solution that would be adopted each time



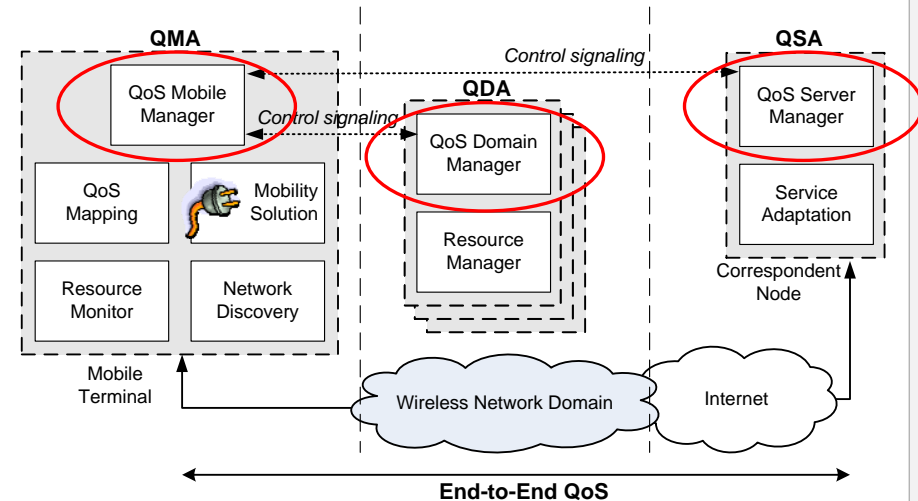
Design Considerations

- ❑ Independence from the mobility solution
- ❑ End-to-end QoS framework involve a fixed network and a wireless access network
 - The paper focuses in the QoS solution for the wireless access network
 - For the fixed network we adopted already mature QoS architectures, such as IntServ and DiffServ
- ❑ Mobile terminal with multi-radio interfaces in order to make use of the soft handover

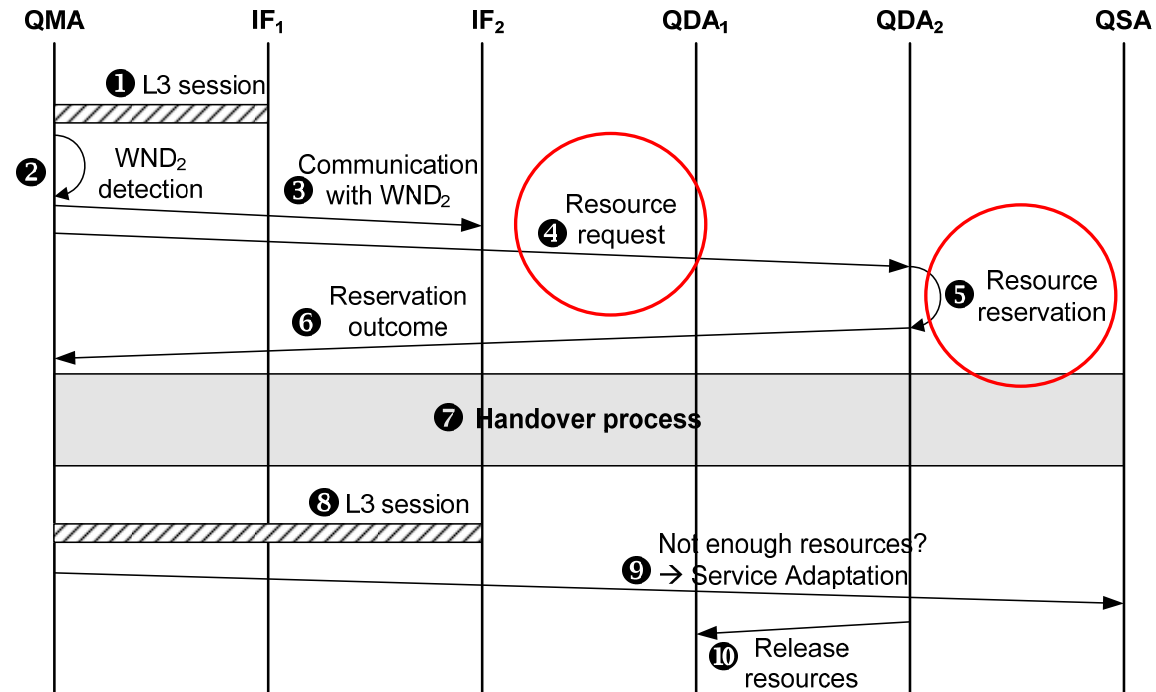


Easy Wireless QoS (EWQoS) Architecture Entities

- ❑ We have identified three entities which would take care of performing the QoS signaling to be performed both before and after the corresponding handover
 - Quality of Service Domain Agent (QDA)
 - Quality of Service Server Agent (QSA)
 - Quality of Service Mobile Agent (QMA)
- ❑ QDA
 - A separated entity or integrated within one of the elements of the wireless access network
- ❑ QMA
 - In the Mobile Terminal
 - Include several modules due to the fact that the proposed architecture follows a user-centric approach
- ❑ QSA
 - In the server applications or correspondent node, as know in Mobile IP.



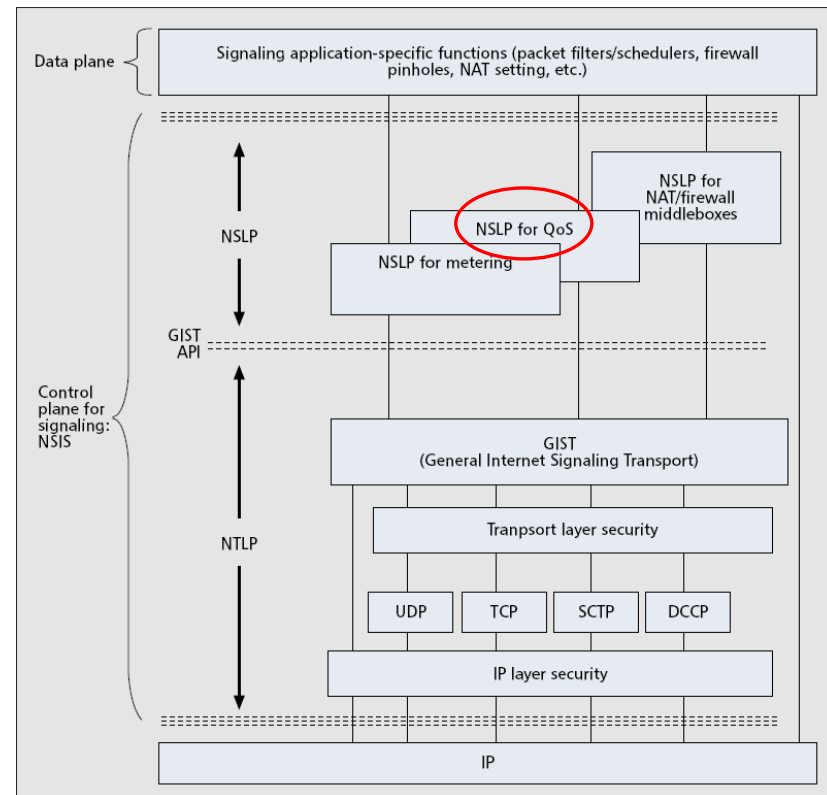
QoS Signaling Description



- ❑ Step 4 and 5 are where resource reservation takes place, both at the wireless access as well as at the core parts of the network
- ❑ Signaling protocol implementation is based on NSIS

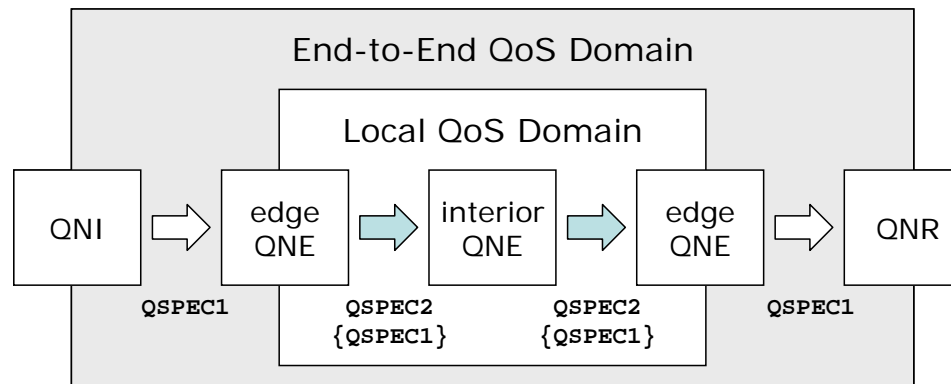
Using NSIS for resource reservation signaling (I)

- ❑ NSIS Transport Layer Protocol (NTLP), use GIST to transport the signaling application layer messages along the data path between NSIS peer-to-peer basis
- ❑ NSIS Signaling Layer Protocol (NSLP), include formats and processing rules of application-specific functionalities
 - One of the NSLPs include the NSLP for Quality-of-Service Signaling (QoS-NSLP), which establishes and maintains reservation states at nodes along the path of a data flow for providing forwarding resources for that flow



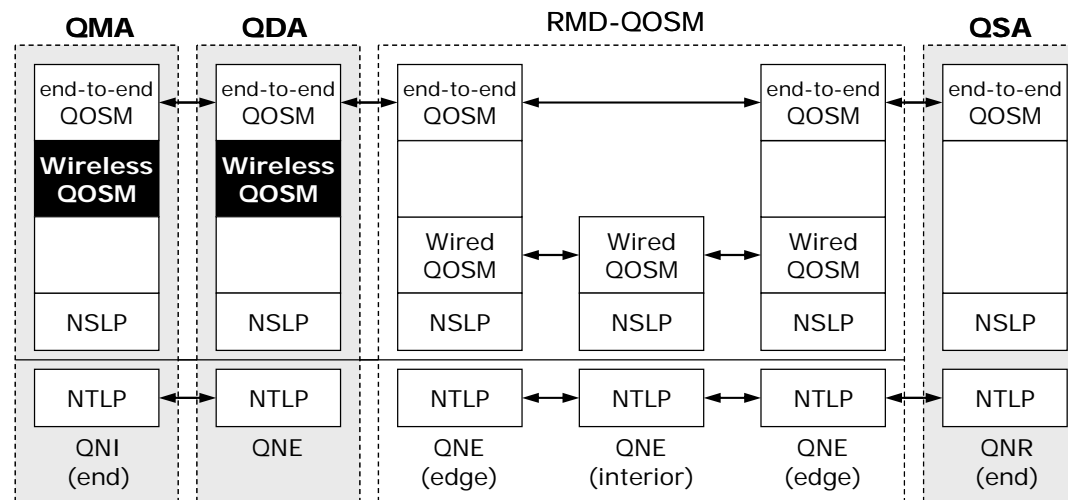
Using NSIS for resource reservation signaling (II)

- ❑ The QoS-NSLP separates the signaling protocol from the Resource Management Function (RMF). Therefore, an end system can make generic end-to-end resource reservations across a mixed wireless and wire line network
- ❑ QoS-NSLP defines the following entities:
 - QoS-NSLP Entity (QNE), an generic NSIS entity, which supports the QoS-NSLP.
 - QoS-NSLP Initiator (QNI), the first node in the sequence of QNEs issuing a reservation request for a session.
 - QoS-NSLP Receiver (QNR), the last node in the sequence of QNEs that receives a reservation request for a session.



Mapping Easy Wireless QoS entities over QoS-NSLP

- ❑ EWQoS defines a specific QoS Model for the wireless access network, the so-called "wireless QOSM"
- ❑ QMA is the entity in charge of initiating the QoS end-to-end request (QNI) and, in addition, it implements, jointly with the QDA, the wireless QOSM
- ❑ QDA, as any other QNE entity, reserves the resources at the wireless networks and communicates with the fixed network to encapsulate the wireless QOSM within the end-to-end QOSM
- ❑ QSA implements the other edge of the end-to-end QOSM (QNR), receiving the request sent by the QNI.



Conclusions

- ❑ We have addressed the design of a generic end-to-end QoS architecture mainly targeted at the maintenance of QoS during the handover between heterogeneous wireless access networks
- ❑ The signaling between the different entities is based on the NSIS suite, more specifically, the QoS-NSLP signaling protocol
- ❑ A QoS model, that incorporates the QoS characteristics of the wireless access network, has been specified
- ❑ The different Easy Wireless QoS entities share a lot of similarities to the ones specified for the QoS-NSLP
 - This allows a compatibility with other QoS models that may be added to the fixed network, such as RMD-QOSM. This eases the specification of an end-to-end QOSM to maintain the QoS between the Mobile Terminal and the Correspondent Node