Information Society Technologies

Sixth Framework Programme

EuQoS general architecture
EEQoS – 2005

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Outline

- EuQoS basic & requirements
- End2end path definition
- Process guideline description
- EuQoS Architecture
  - Provisioning process
  - Invocation process
  - OAM process
- Conclusion

EuQoS basic Requirements (1)

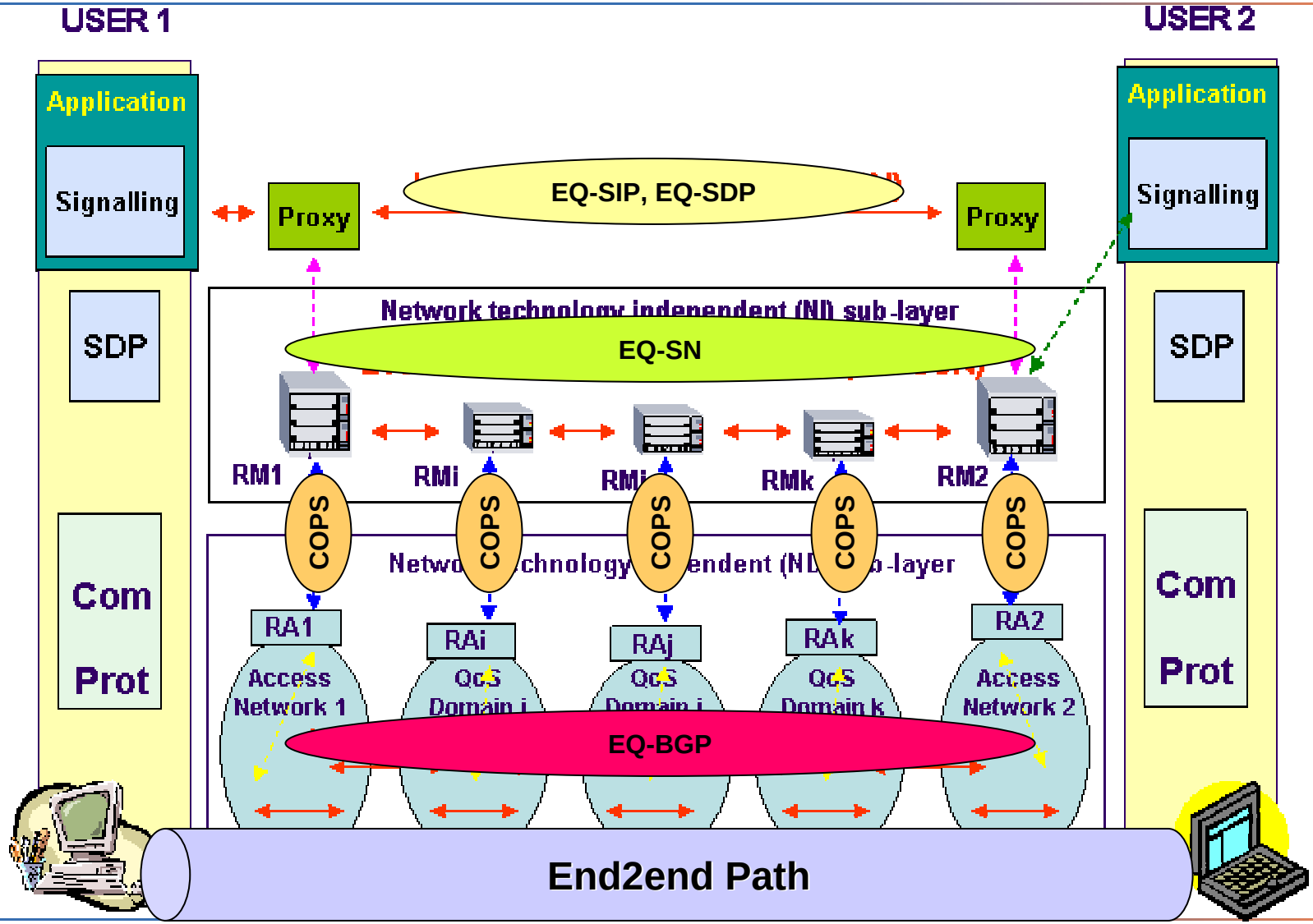
- Scalable QoS architecture
  - IntServ over DiffServ

    This was done by performing IntServ CAC in the Access network and used DiffServ in the Core backbone
  - Lightweight IntServ/RSVP

    This was done by study/develop a new protocol. NSIS could be a candidate
  - Endpoints only CAC methods

    This was done by setup Traffic engineering tunnel or by measurement at the endpoint
- Finally EuQoS is a mix of them

EuQoS basic Requirements (2)

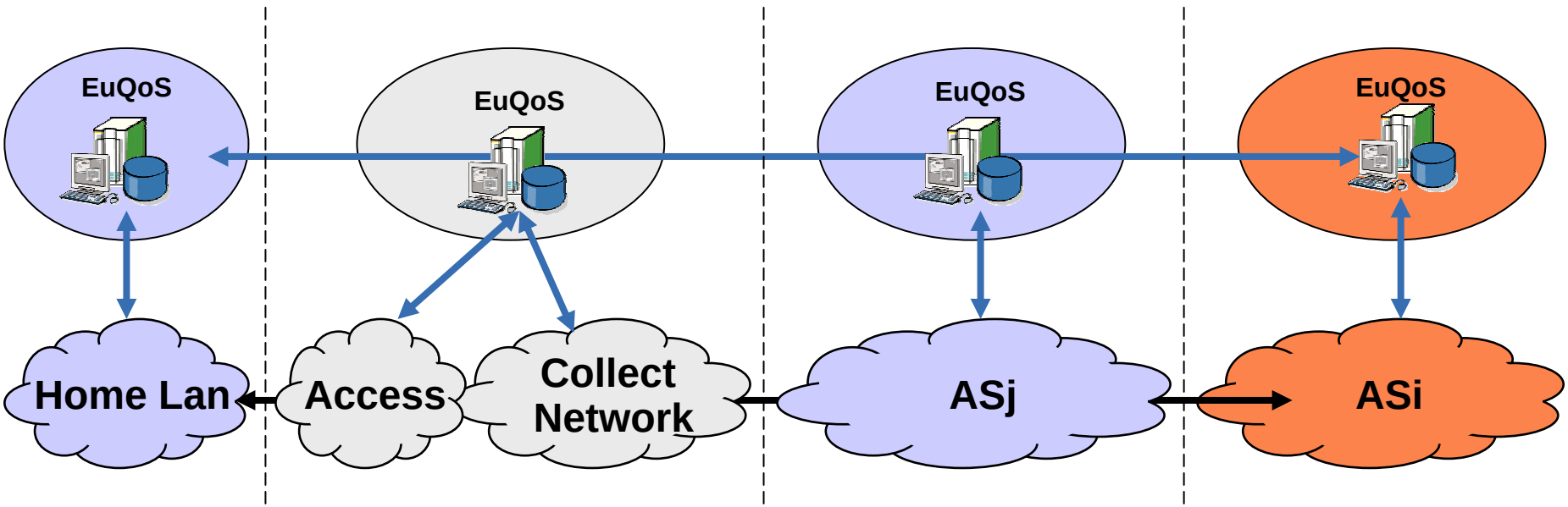


EuQoS basic Requirements (3)

- Resources Manager (RM) perform end2end network technology independent QoS control
  - Setup, use and monitor End2end path
  - Perform inter-domain CAC (distributed among all RM) and local intra-domain CAC
  - Traffic Engineering and Route Optimization (TERO)
  - Monitoring, Measurement & Fault Management (MMFM)
  - Implement RM-SSN
- Resource Allocator (RA) perform local network technology dependent QoS enforcement
  - Enforce QoS regarding the underlying technology
  - Provide information to RM

EuQoS basic requirements (4)

- Divided the problem in smaller part: From end2end up to small network
  - Separate AS domain
  - Split Access/Aggregation-Collect and Core
  - Take into account HomeLan

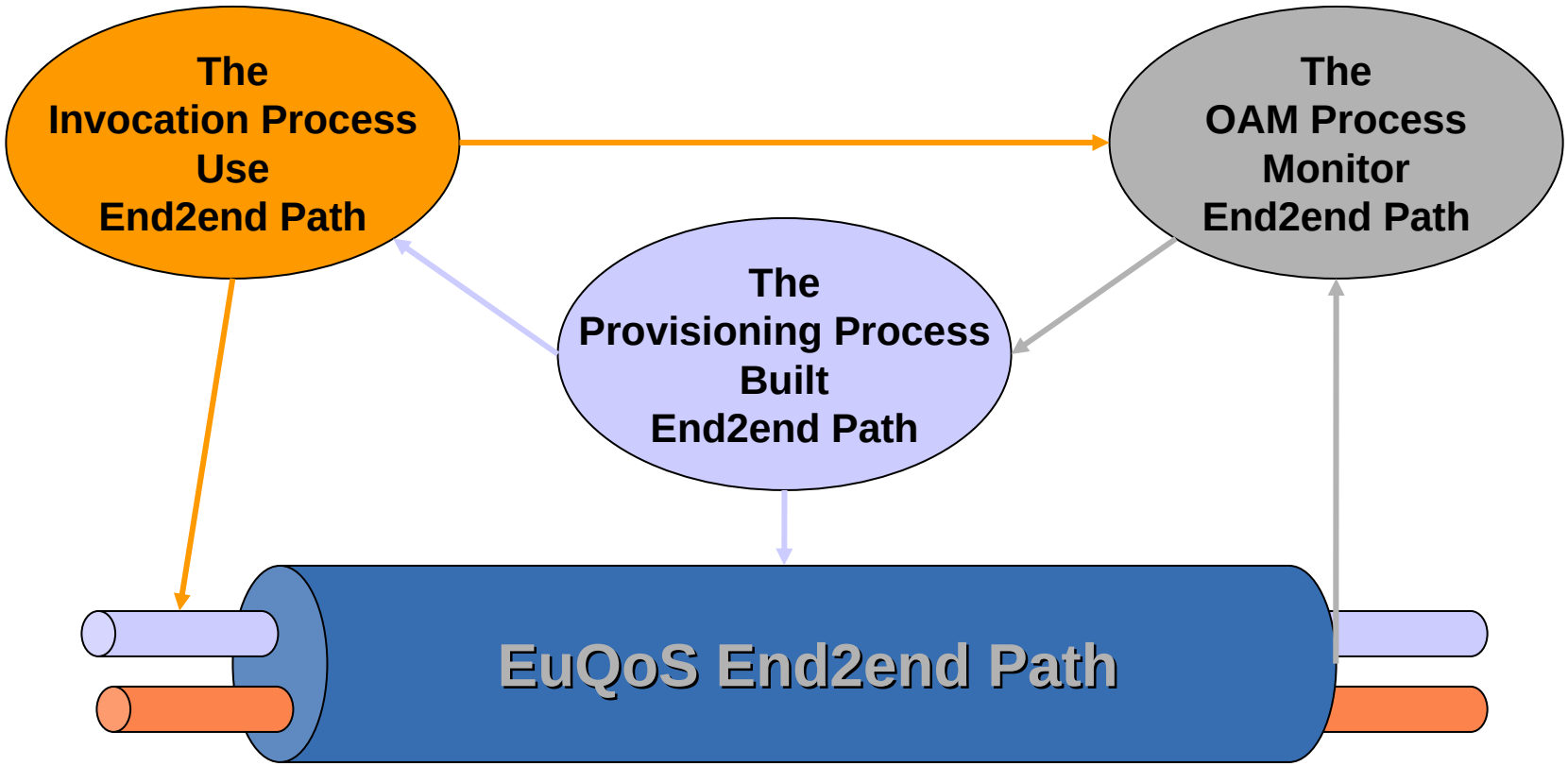


End2end path definition

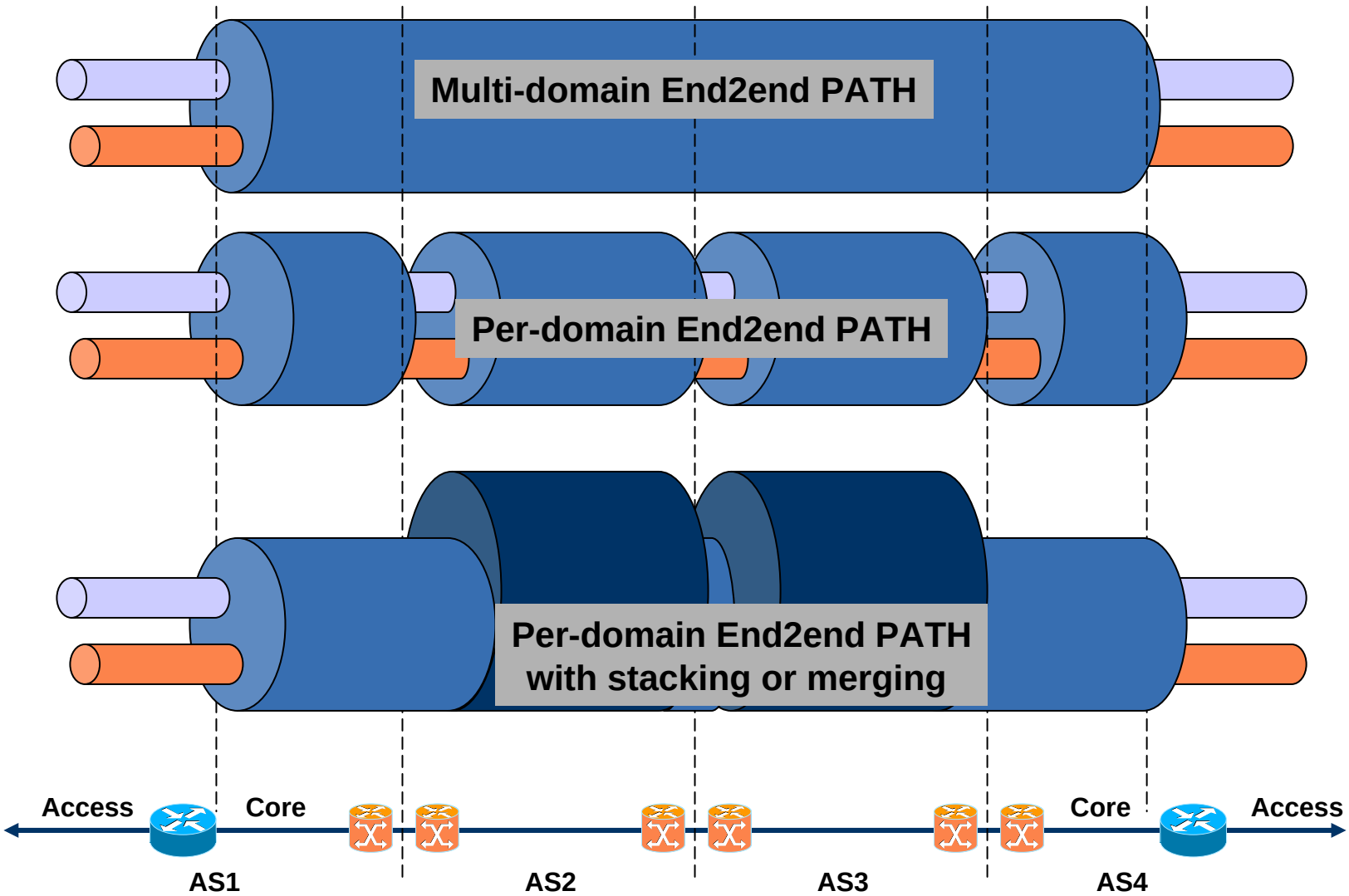
- End2end path provide a QoS path to reach a given prefix or @IP in a given Class of Service
- The end2end QoS belong to a given CoS
  - Bandwidth of the end2end path
  - Maximum delay, jitter, packet loss
- Must be setup by provisioning
  - At layer 2: ATM VP, VLAN
  - Or at Layer 3: MPLS-TE LSP, GRE tunnel, DiffServ
  - For each type of network: Access and Core
  - Manually or automatically
- Similar to traditional PSTN telecom network

EuQoS End2end path

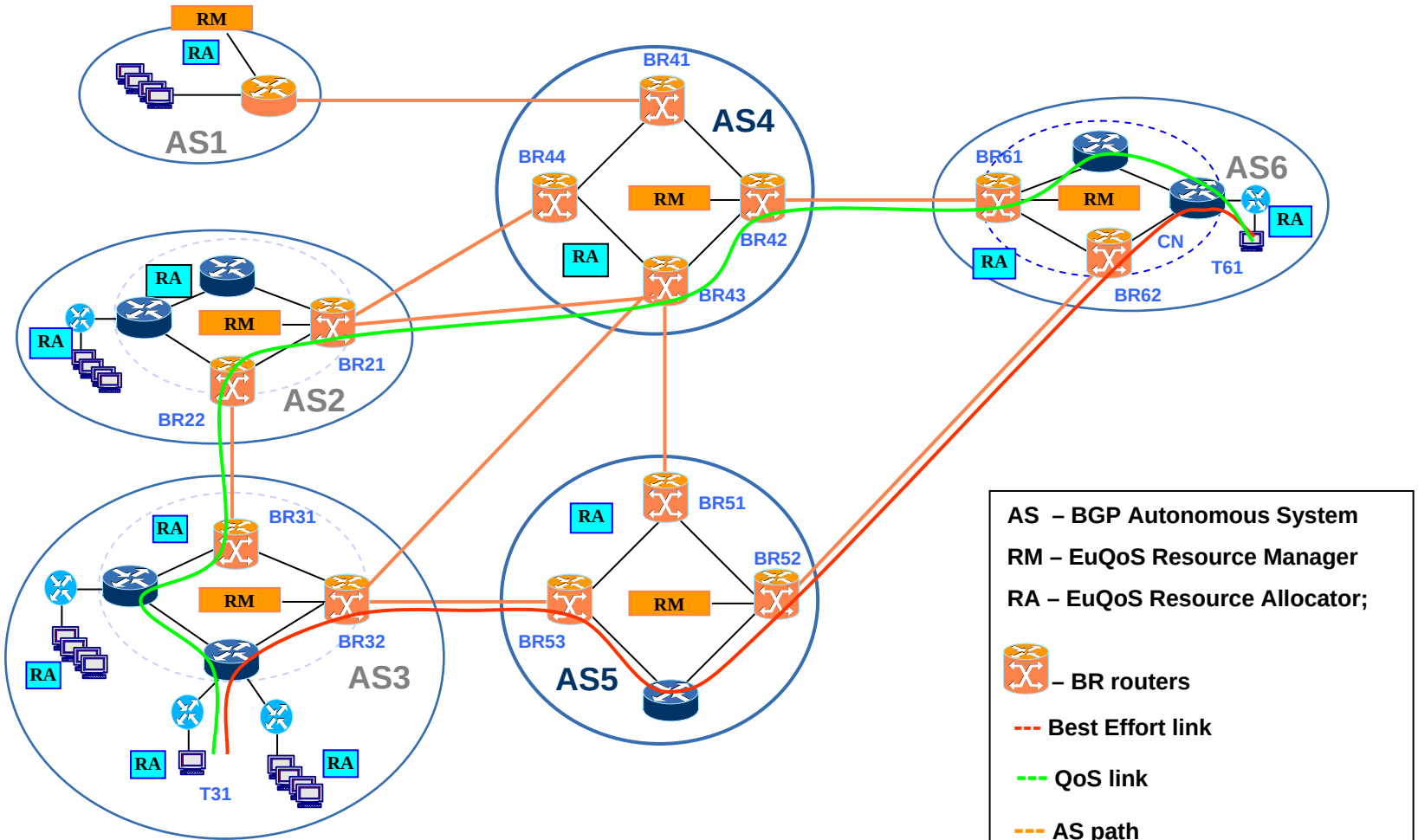
- End2end path provide a QoS path between 2 Access Network through several backbone for a given Class of Service



End2end path option



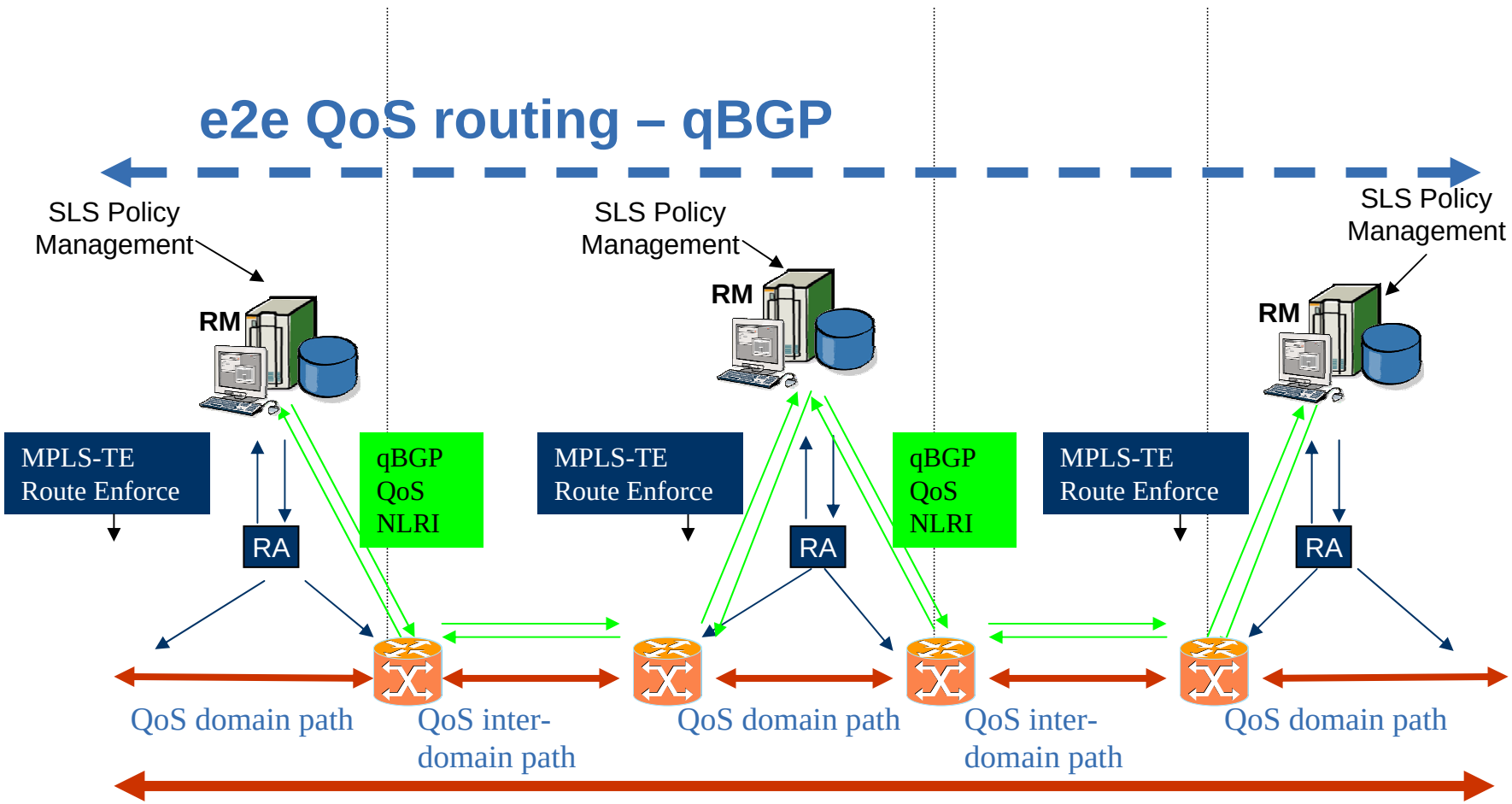
End2end path vs. complexity of AS and BR connectivity



End2end path regarding QoS route

- EuQoS system must be aware of the QoS capabilities along the data path
  - By means of qBGP or Traffic Engineering
- qBGP guarantee an AS path inside a given CoS for delay, gigue & lost parameters
  - There is a PhB continuity along the AS path
  - There is no bandwidth guarantee
- MPLS-TE guarantee an AS path tunnel inside a given CoS for bandwidth, delay, gigue & lost parameters
  - There is no bandwidth guarantee inside the tunnel
- CAC must be perform in order to
  - Choose the appropriate End2end path to meet the CoS
  - Perform bandwidth control to protect the QoS end2end path

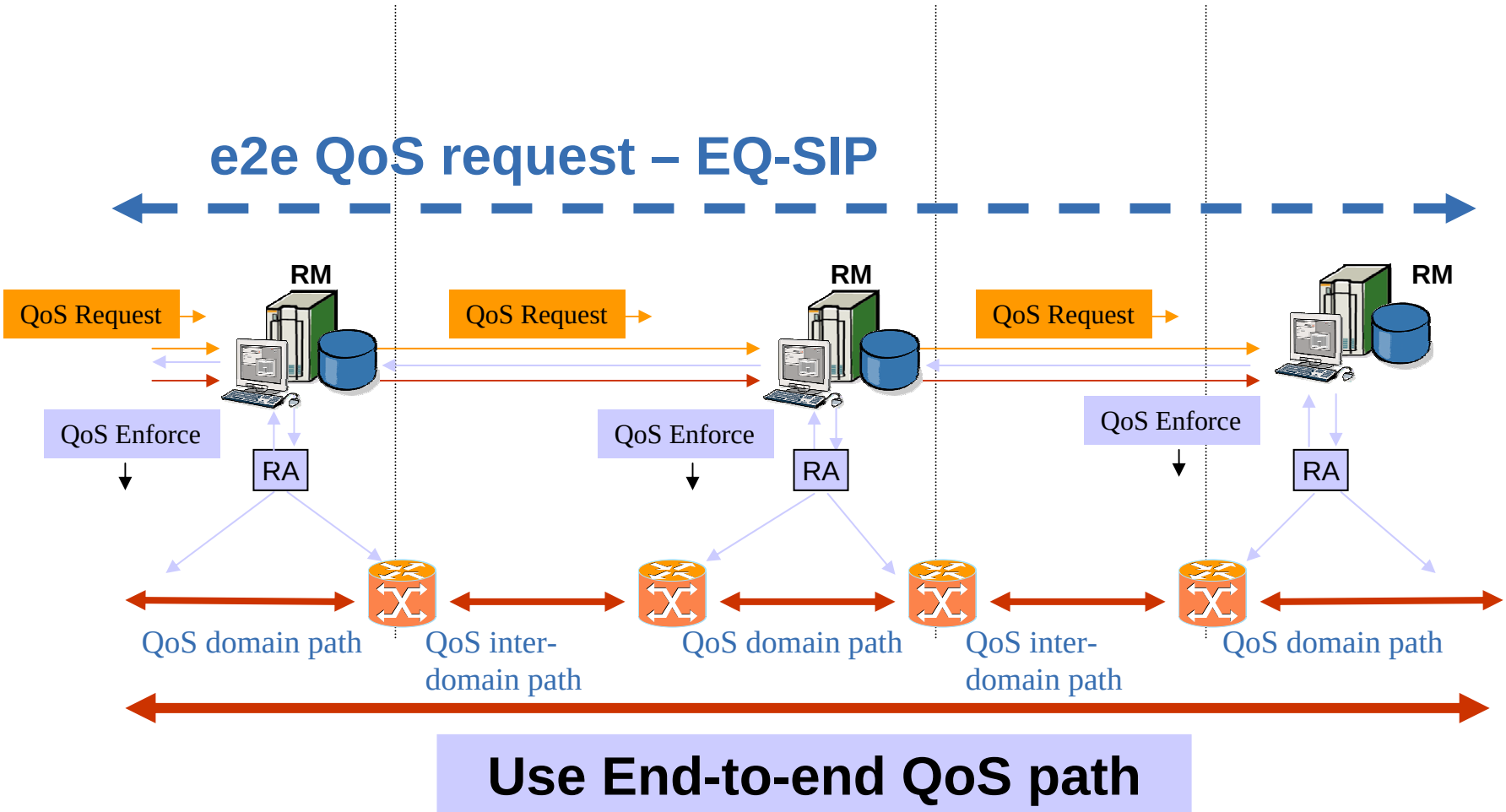
Setup of End2end Path



Maintenance of End2end path

- Monitor intra domain part of the end2end path
  - To detect failure in the intra domain and the peer link
  - To optimize resources usage in the intra domain and for the AS path
- Failure detection are detected and reported to the next RM through qBGP new NSLRI
  - qBGP will recomputed the best AS path if necessary
  - MPLS-TE backup tunnel are activate if necessary
- Link usage are measured and reported to the next RM through qBGP new NSLRI
  - At a slow time scale and when threshold are achieved
  - qBGP will recomputed the best AS path if necessary
  - MPLS-TE tunnel will be resize if necessary

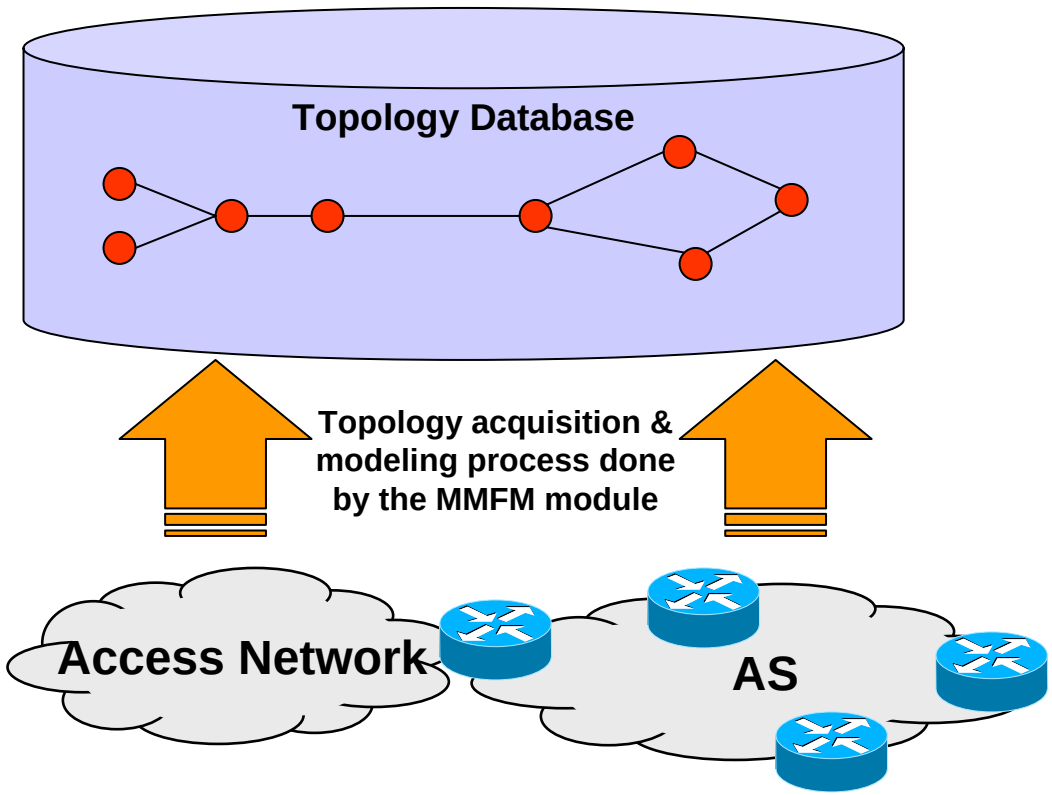
Usage of End2end path



RM detail : CAC function

- Real topology are virtualized in the database
  - Only link with QoS characteristics and node bandwidth capacity are represented for each End2end path and CoS

- CAC just choose the most appropriate End2end path regarding the CoS
  - For this End2end path, the CAC verify the bandwidth availability on each link and node belong to the End2end path
  - If resources are available, the CAC reserved the bandwidth and update the link and node capacity



Conclusion

- EuQoS system is based on End2end path concept
- End2end path is efficient, reliable and scalable
  - Efficient since the invocation used them and not built them
  - Reliable since the OAM process monitor the end2end path
  - Scalable as they describe AS path and could be merge
- End2end path could be accommodate to various configuration and technology
  - Both "loose" and "hard" model are supported
  - End2end path could be setup at Layer 2 or Layer 3
  - Over-provisioned network are also supported through dummy end2end path
- EuQoS system will be built progressively
  - Phase0: End2end path will be setup manually
  - Phase1: End2end path will be setup with the loose model
  - Phase2: End2end path will be setup with both loose and hard model