

Current Standardization of Packet and Flow Monitoring Technology

Jürgen Quittek

NEC Europe Ltd., Network Laboratories, Heidelberg, Germany

quittek@ccrle.nec.de

Outline

- **IETF IPFIX and PSAMP**
 - missing: IPPM (IP performance metrics)
- 3GPP IP flow-based bearer-level charging
- ITU SG3 International Internet Connectivity

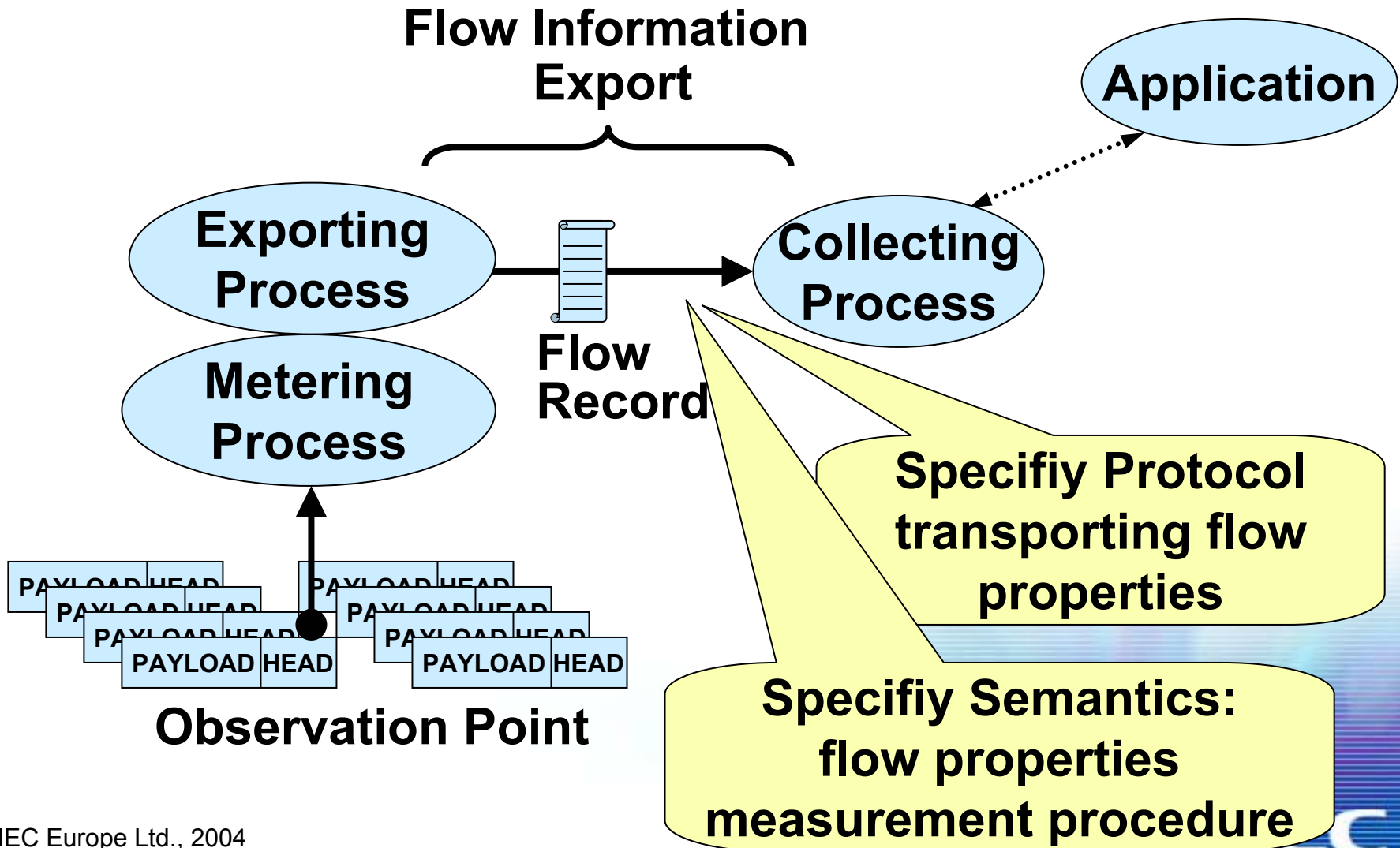
IETF IPFIX Working Group

- IP Flow Information eXport (IPFIX)
 - BoF sessions 12/00 and 08/01
 - active since 10/01
- Successor of RTFM (Real-Time Flow Measurement) working group
- Target (official): standardizing current practice
 - Target (unofficial): standardizing (something like) Cisco NetFlow
- Chairs
 - Nevil Brownlee, CAIDA / University of Auckland
 - David Plonka, University of Wisconsin

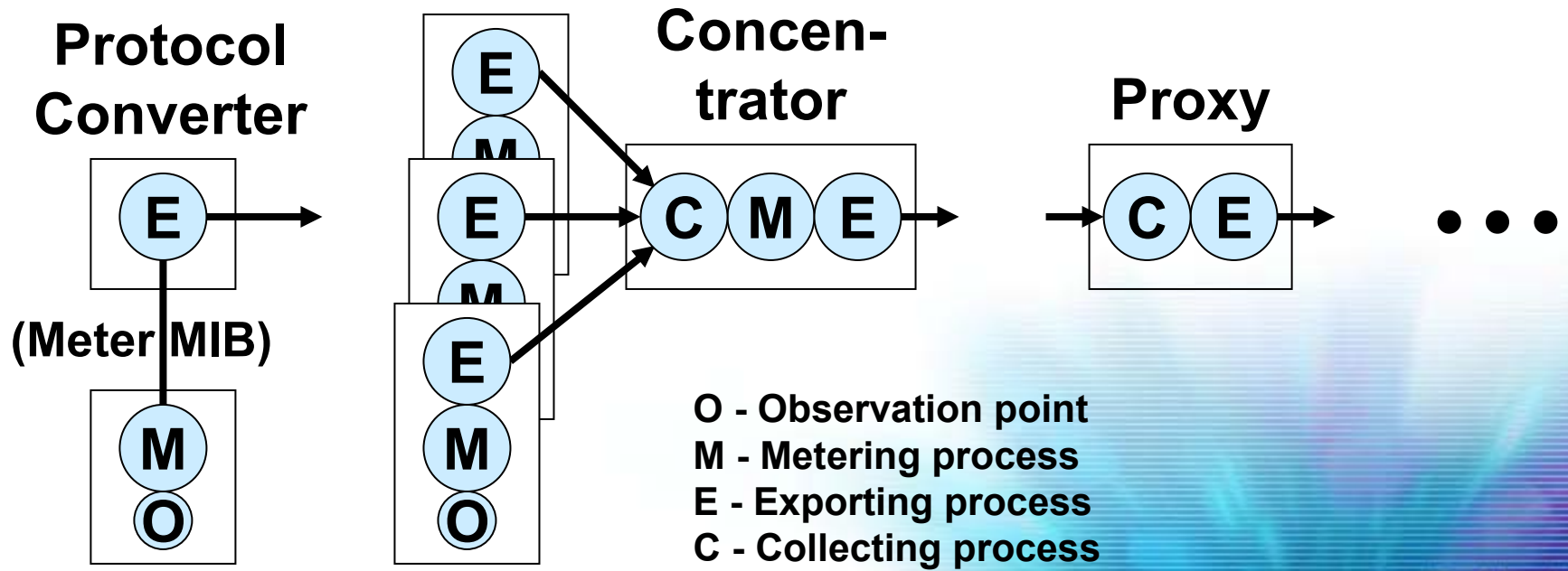
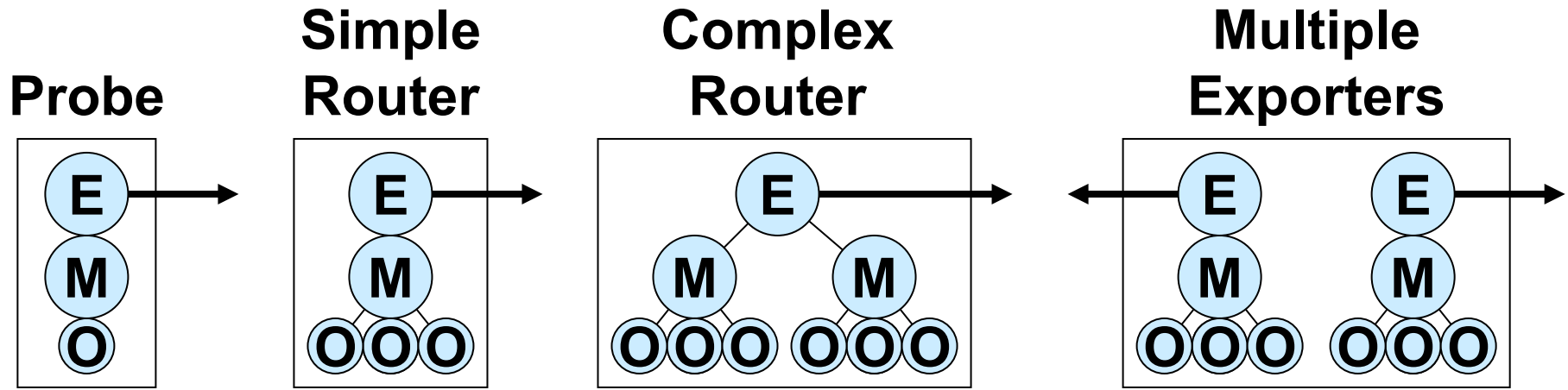
IPFIX Scope and General Requirements

- Goal:** Find or develop a basic common IP Traffic Flow measurement technology to be available on (almost) all future routers
- Fulfilling requirements of many applications
 - Low hardware/software costs
 - Simple and scalable
 - Metering to be integrated in general purpose IP routers and other devices (probes, middleboxes)
 - Data processing to be integrated into various applications
 - Interoperability by openness or standardization

IPFIX Architecture



IPFIX Devices



O - Observation point
M - Metering process
E - Exporting process
C - Collecting process

IPFIX WG: Expected Output

- Planned documents
 - Requirements RFC (completed?)
 - Architecture RFC (in progress)
 - Protocol specification (in progress)
 - Information model RFC (in progress)
 - Applicability RFC (just started)
- No new protocol development in working group
- Instead: protocol selection and refinement
- Selected protocol: NetFlow version 9
- Configuration of measurements will not (yet?) be standardized

IPFIX WG: Current Status

- Major design decision:
 - protocol based on NetFlow version 9
 - SCTP will be the mandatory transport protocol.
 - different to NFv9
 - TCP and UDP are optional.
- Protocol design (refinement of NFv9) still needs a lot of work
 - discussed simplifications of the NFv9 approach
 - 6 binary message formats defined by NFv9
 - 4 template records, 2 data records
 - probably no more than 2 required: 1 template & 1 data
- Completion of most documents expected in 2004
- NetFlow version 9 implementation report would probably be very welcome input
- More information at <http://ipfix.doit.wisc.edu>

IETF PSAMP Working Group

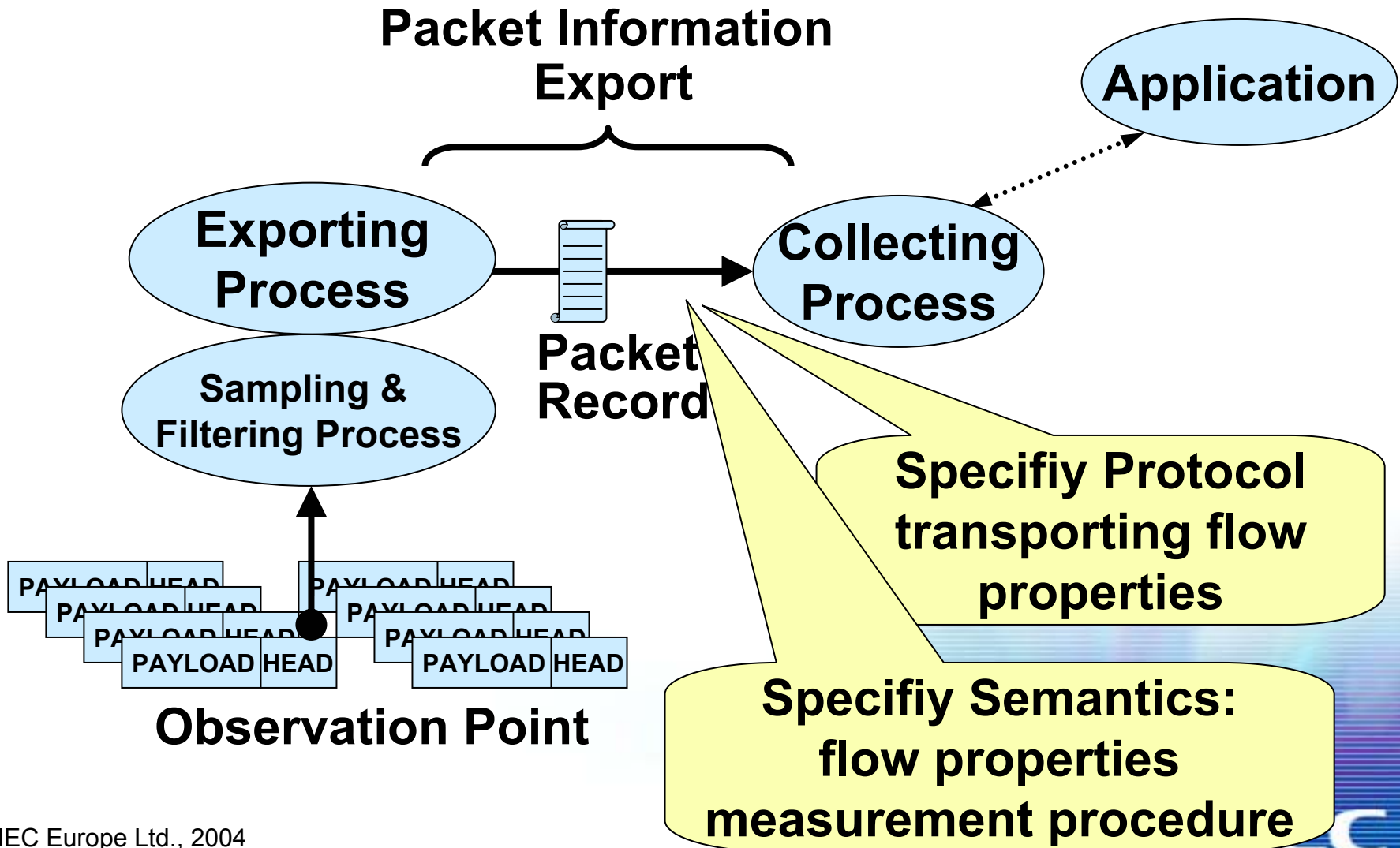
- Packet SAMPLing (PSAMP)
 - BoF session 03/02
 - active since 07/02
- Initiated by Nick Duffield, AT&T
- Target: standardizing new technology for sampling, filtering and exporting packets
 - can be interpreted as a component of the IPFIX measurement process
 - but different to IPFIX, there is no (or very little) current practice
- Chairs
 - Andy Bierman, Cisco
 - Juergen Quittek, NEC

PSAMP Scope and General Requirements

Goal: Develop effective but low-cost packet sampling technology

- Allowing measurements at high-speed links
- Fulfilling requirements of applications using per packet measurement
 - QoS analysis, traffic profiling
- Very low hardware/software costs
- Much simpler than IPFIX
- Will use subset of IPFIX protocol
- Sampling to be integrated in general purpose IP routers and other devices (probes, middleboxes)
- Configuration of sampling included (different to IPFIX)

PSAMP Architecture



PSAMP WG: Expected Output

- Planned documents
 - Framework RFC (almost completed)
 - Packet Sampling and Filtering Spec. RFC (progressed far)
 - Report Format and Protocol specification (first versions)
 - PSMAP MIB RFC (in progress)
 - Applicability RFC (not started)
- Dependencies on IPFIX protocol development

PSAMP WG: Current Status

- Packet selection methods selected
 - hash-based sampling
- Working group decided to use IPFIX protocol
 - some work has to wait for IPFIX
- Completion of most documents expected in mid 2004

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- **3GPP IP flow-based bearer-level charging**
- ITU SG3 International Internet Connectivity

Current Situation

- 3GPP has started developing a standard for charging of IP-based services
- Requirements are (almost) fixed
- The charging architecture will soon be completed
 - supports offline charging and credit-controlled online charging
- Detailed specification of functions and protocols will start soon

Goals of Standardization

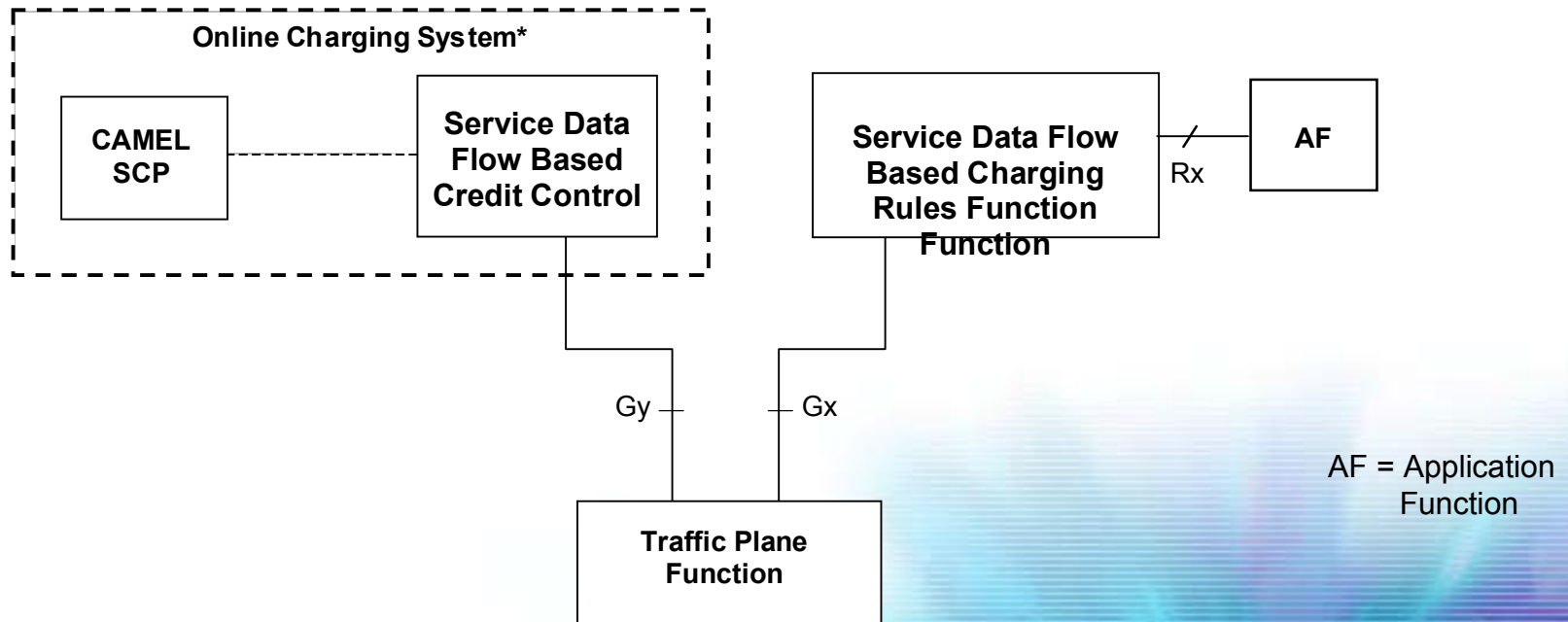
- Main goal: **Increase charging capability and charging flexibility compared to GPRS**
- Variable charging schemes applicable to existing and new IP services
 - volume based, time-based, other
 - offline-charging, credit-based online charging
- Enabling charging per service
- Value added services may define their own charging schemes

3GPP Working Groups Involved

- SA1: Requirements for charging of IP-based services
 - **done**
- SA2: Architecture for IP flow-based bearer level charging
 - **will be completed soon**
- SA5: Specification of functions and protocols
 - **just started**

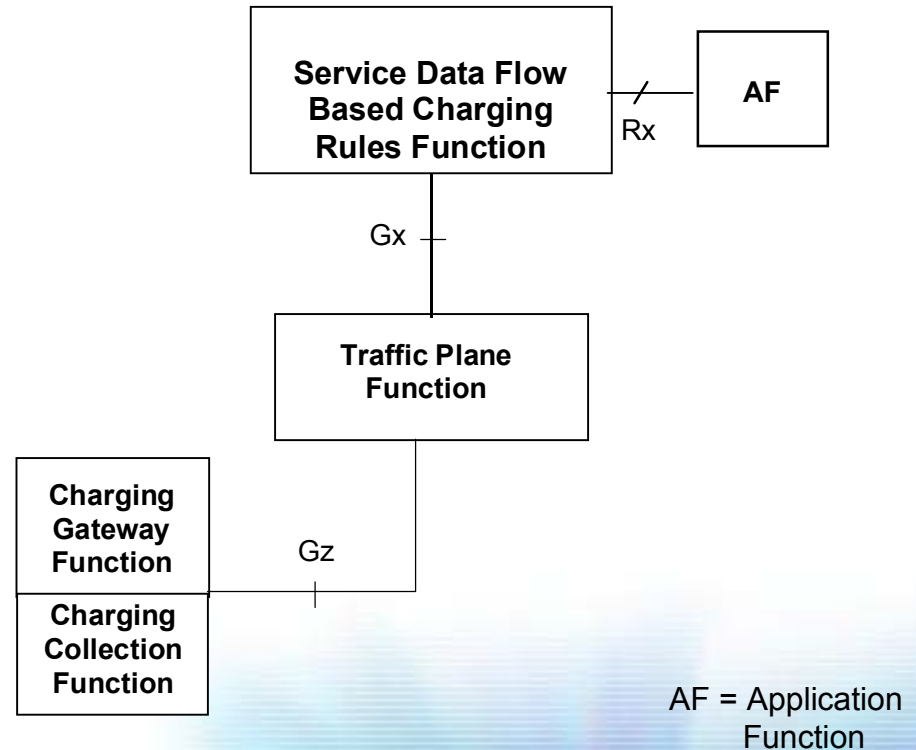
Architecture Overview: Online Charging

- Service specific charging rules
- Service specific credit control



Architecture Overview: Offline Charging

- Service specific charging rules
- Service specific charging gateway functions
- Service specific (or service provider specific) charging collection functions



Work Ahead

- Definition of charging rules specification language
 - simplicity,
 - expressibility (coverage of assumed service requirements)
- Definition of functions
 - charging rules functions
 - traffic plane functions
 - credit control functions
 - charging gateway functions
 - charging collect functions
- Definition of protocols: Gx, Gy, Gz
 - candidates are
 - IETF AAA (Authentication, Authorization, Accounting)
 - IETF IPFIX (IP Flow Information eXport)
 - IPDRF IPDR (IP Detailed Record)

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International Internet Connectivity

- ITU Study Group 3 Rapporteur Group
- **Goal:** Give recommendations on the accounting of traffic between Internet service providers
- Just recommendations no obligation
- Highly political issue
- First version of this ITU-T Recommendation D.50 developed 1997-2000
 - recommendation part of the document consists of 4 lines of text: "... take into account the possible need for compensation between them [the ISPs] for the value of elements such as traffic flow, number of routes, geographical coverage and cost of international transmission amongst others."
- This statement was already too strong to be supported by Greece and by the USA.

International Internet Connectivity

- Next approach: Extending 4 lines to 6 including a pointer to an addendum
- Taking more properties into account
 - flow-related: service performance, ...
 - not flow-related: dedicated capacity provided, network resilience, ...
- ISP interaction
 - peering, asymmetric charging, ...
- Cost sharing of international connection
- Goal: agree on new version in autumn 2004