Source: **SA5 (Telecom Management)**

Title: **3 Rel-5 CR 32.101 (3G Telecom Management principles and high level requirements)**

Document for: **Decision**

Agenda Item: **7.5.3**

Doc-1st-Level	Spec	CR	R	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
SP-020013	32.101	016		Rel-5	**Correction and update to QoS Management (alignment on Policy Management with S2, CN3 in 23.207, 29.207)**	F	4.2.0	5.0.0	S5-020133	OAM-AR
SP-020013	32.101	017		Rel-5	**Introduction of Subscriber and Equipment Trace Management**	B	4.2.0	5.0.0	S5-020134	OAM-AR
SP-020013	32.101	018		Rel-5	**Update of Accounting Management to cover the IMS (alignment with SA5's 32.200 Charging management; Charging Principles)**	B	4.2.0	5.0.0	S5-020171	OAM-AR

CR-Form-v5

CHANGE REQUEST

⌘   **32.101 CR 016**   ⌘ **rev**   **-**   ⌘   Current version: **4.2.0**   ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE ☐   Radio Access Network ☐   Core Network **X**

Title:	⌘	Correction and update to QoS Management (alignment on Policy Management with S2, CN3 in 23.207, 29.207)

Source:	⌘	SA5		

Work item code:	⌘	OAM-AR	***Date:*** ⌘	01/03/2002

Category:	⌘	**F**	***Release:*** ⌘	REL-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:	
		F *(correction)*	*2* *(GSM Phase 2)*	
		A *(corresponds to a correction in an earlier release)*	*R96* *(Release 1996)*	
		B *(addition of feature),*	*R97* *(Release 1997)*	
		C *(functional modification of feature)*	*R98* *(Release 1998)*	
		D *(editorial modification)*	*R99* *(Release 1999)*	
		Detailed explanations of the above categories can	*REL-4* *(Release 4)*	
		be found in 3GPP <u>TR 21.900</u>.	*REL-5* *(Release 5)*	

Reason for change:	⌘	To correct and update QoS Management text in Annex D

Summary of change:	⌘	The Annex has been updated to ensure alignment with the work in S2 and CN3 on Policy Management. In particular:
		- The term Policy Decision point has been used throughout the annex. A note has been added to section D.1.2.4 to explain that the Policy decision point is equivalent to the term PCF used in 23.207 and 29.207.
		- Section D.1.2.4 has been updated to align this with 23.207 and 29.207
		- Figure D.2 has been updated to show the functional options. The reference points have been labelled and text describing the possible implementations has been added to section D.1.2.1.
		- Alignment of text around the functional entities, i.e. use of EML and NML

Consequences if not approved:	⌘	The Annex will be inconsistent with 23.207 and 29.207

Clauses affected:	⌘	Annex D

Other specs affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

Annex D (informative): QoS Management

D.1 Overview

QoS Management, from an OAM&P perspective, in 2.5G and 3G networks primarily consists of two functional areas: QoS policy provisioning and QoS monitoring. QoS Policy Provisioning is the process of configuring and maintaining selected Network Elements with QoS policies that are created based upon customer SLAs and observed network performance. QoS Monitoring is the process of collecting QoS performance statistics and alarms; this data is then used to generate analysis reports for making changes/upgrades to the network. The detailed relationship between SLA Management and QoS Provisioning and Monitoring is for future study. A conceptual breakdown of QoS Management is shown in Figure D.1.
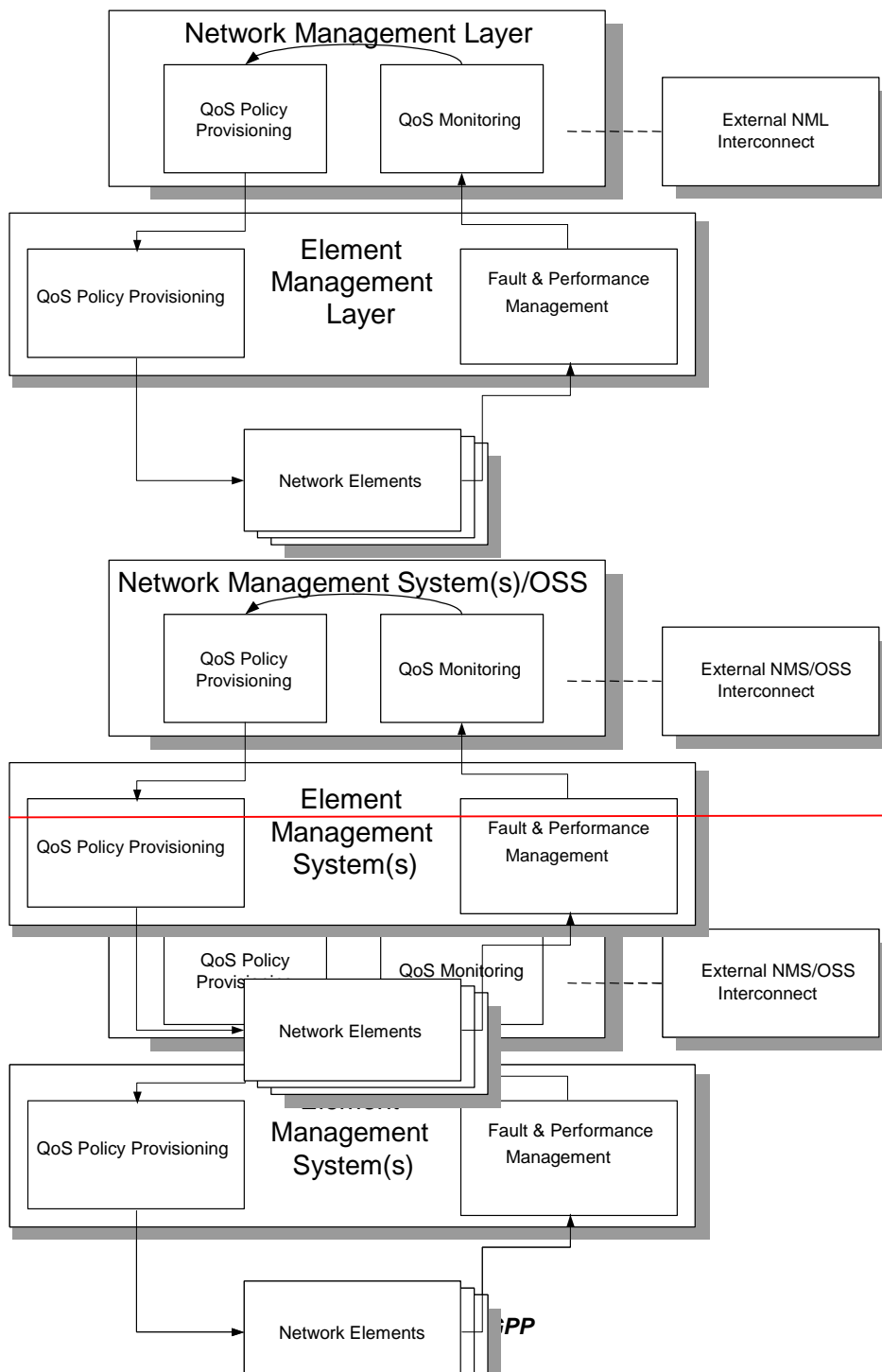
Figure D.1: QoS Management

The following subclauses provide descriptions of QoS Provisioning and Monitoring.

It should be noted that the same descriptions could apply to other Policy Management instantiations, e.g. Security and Service Provisioning.

D.1.2 QoS Provisioning

In the 2.5G and 3G networks, multiple network domains **must** inter-work in order to provide the end-to-end quality of service required by end-user applications. To add to this complexity, there are many classes of Network Elements from many network infrastructure suppliers, each of which require configuration in a consistent manner in order to the network operator's QoS objectives. Within each Network Element, there are many QoS functions (such as Admission Control, Policers, Shapers, Queue Manager and Scheduler), which **must** be configured.

In order to configure these heterogeneous networks so that they can deliver the desired QoS, the operator needs a management solution that meets the following high-level requirements:
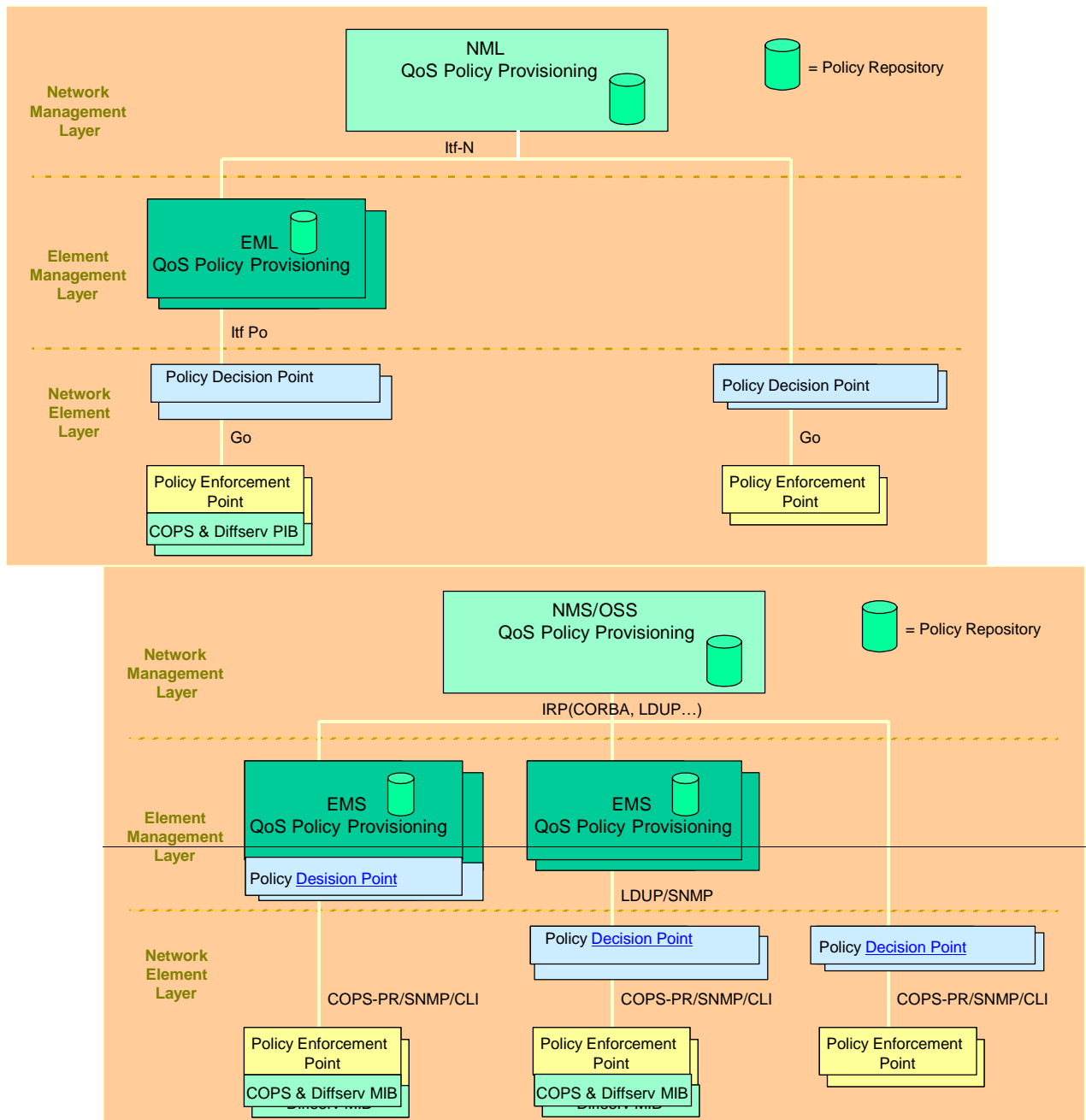
- *Automation* of management tasks.

- *Centralized* management with fewer classes of management interface.

- *Abstracted* (or simplified) management data.

- *End-to-End* provisioning of the network.

- *Consistent and uniform* provisioning across all Network Elements.

- *Standards-based* solution in order to allow *inter-operability* at Network Element and OSS level.

- *Scalable* solution for large networks.

The IETF Policy Management Framework has been designed with these requirements in mind

The various standards that apply to QoS Policy Provisioning as described in the following subclauses are listed in D.1.4.1. At time of publication of the present document (June 2001) there are also a significant amount of IETF Drafts available on the subject at http://www.ietf.org

D.1.2.1 Conceptual Architecture

The conceptual architecture for a policy-based QoS Management System is shown in Figure D.2.

NML
QoS Policy Provisioning

= Policy Repository

Network
Management
Layer

Itf-N

EML
QoS Policy Provisioning

Element
Management
Layer

Itf Po

Network
Element
Layer

Policy Decision Point

Policy Decision Point

Go

Go

Policy Enforcement
Point

COPS & Diffserv PIB

Policy Enforcement
Point

NMS/OSS
QoS Policy Provisioning

= Policy Repository

Network
Management
Layer

IRP(CORBA, LDUP…)

EMS
QoS Policy Provisioning

EMS
QoS Policy Provisioning

Element
Management
Layer

Policy Desision Point

LDUP/SNMP

Network
Element
Layer

Policy Decision Point

Policy Decision Point

COPS-PR/SNMP/CLI

COPS-PR/SNMP/CLI

COPS-PR/SNMP/CLI

Policy Enforcement
Point

COPS & Diffserv MIB

Policy Enforcement
Point

COPS & Diffserv MIB

Policy Enforcement
Point

NOTE: The 3GPP Term Policy Control Function (PCF) is equivalent to the IETF Term Policy Decision Point (PDP)

Figure D.2 QoS Provisioning

The architectural components identified in figure D.2 are described in the following subclauses.

NOTE: The Policy Repository and the Policy Decision Point can be implemented on the same node.

The Itf N interface is specified in the 32 series.

The Itf Po, between the Policy Repository and the Policy Decision Point is to be defined. The protocols under consideration includes: LDAP, LDUP, SNMP and COPS-PR.

The reference point Go is defined in 23.207[22] and the interface implementing the reference point is defined in 29.207 [23].

## D.1.2.2	NMLS/OSS QoS Policy Provisioning

This is a network-level operational support function that serves as the policy administration point for the entire network.

The NMLS/OSS QoS Policy Provisioning provides the following functions:

- Network policy administration user interface

- Master network policy repository for storage of all network policies for all domains

- Policy distribution capability to distribute policy data to the EMLS Policy servers.

- Global policy conflict detection

The policy repositories will use an LDAP-based directory to store the policy information.

## D.1.2.3	EMLS QoS Policy Provisioning

This is an element management function that serves as the policy administration point for a network domain. A domain is an area of the network that contains equipment that performs a logically related function. Examples of network domains are: access network, core network and transport network, or supplier specific sub-networks within these networks.

The EMLS QoS Policy Provisioning provides the following functions:

- An optional EMLS-level policy administration user interface.

- EMLS-specific policy repository.

- Policy distribution capability to distribute policy data to the Policy Decision Points.

- Local policy conflict detection

It is envisioned that the optional EMLS-level policy administration user interface will be required in small networks that do not have a network-level policy provisioning OSS.

Note that EMLS-specific policy repositories contain policies that apply only to that domain as well as general network policies that apply across domains.

Finally, EMS QoS Policy Provisioning may also contain a policy decision point in those cases where there is no Network Element that can effectively support this function. However, this will place mores stringent requirements on the EMS such as higher availability.

## D.1.2.4	Policy Control Function/Policy -Decision Point

The contents of this subclause fall under the responsibility of 3GPP TSG SA WG2 (SA2) and will be described by specifications from that group in the 3GPP Release 5 time frame.

The description given in this section is taken from TS 23.207[22] and TS 29.207 [23]. If there are any inconsistencies then the definitions in TS 23.207[22] and TS 29.207[23] take precedence.

NOTE: The 3GPP Term Policy Control Function (PCF) used in TS 23.207 [22] and TS 29.207[23] is equivalent to the IETF Term Policy Decision Point

The policy Control Function/Policy Decision Point is the point in the network at which policy decisions are made for the functions as a policy server and translator for the Policy Enforcement Points under its scope of control. Whereas the Policy Enforcement Point is a function within a network node, the Policy Decision Point is separate functional entity that may reside within a separate Policy Server, for example, on an application server. The Policy Decision Point will make decisions based on the policy information held within the Policy Repository.

It contains a policy repository as well as a translation function that converts policies from a QoS policy schema representation to a Policy Information Base (PIB), which is a representation that can be understood by the Policy Enforcement Point and loaded into the associated Network Element MIB.

The Policy Decision Point provides the following functions:

- ~~Domain-specific policy repository~~

- Retrieval of Policy Information from the policy repository

- Evaluates the policy information retrieved and decides what actions needs to taken.

- ~~Policy distribution capability to d~~Distributes policy data to the Policy Enforcement Points. This distribution can either be sent to the PEP by the Policy Decision Point or the Policy Decision Point can wait for the PEP to request the information.

- Translation from QoS policy schema employed by the policy servers to Policy Information Base (PIB) format employed by the Policy Enforcement Points.

- Optional real-time policy decision-making function.

- Local policy conflict detection

The optional real-time policy decision-making function may be required when dynamic policy decisions **must** be made in response to current network conditions..

NOTE: ~~The 3GPP Term Policy Control Function (PCF) is equivalent to the IETF Term Policy Decision Point (PDP)~~

D.1.2.5 Policy Enforcement Point

~~The contents of this clause fall under the responsibility of 3GPP TSG SA WG2 and will be described by specifications from that group in the Release 5 time frame.~~

The description given in this section is taken from TS 23.207[22] and TS 29.207 [23]. If there are any inconsistencies then the definitions in TS 23.207[22] and TS 23.29.207 take precedence.

The Policy Enforcement Point is a function that is part of a Network Element that **must** implement the policies defined by the policy administration system(s).

The Policy Enforcement Point provides the following functions:

- Storage of policy-related data locally~~in its MIB~~.

- Execution of policies as network conditions dictate.

- Support for the Differentiated Services QoS mechanism (diffserv).

On initialization, the Policy Enforcement Point will contact its parent Policy Decision Point and request download of any policy data that it requires for operation. Note that information such as the address of the parent Policy Decision Point function **must** be provisioned in the Policy Enforcement Point MIB as part of normal network provisioning.

D.1.3 QoS Monitoring

QoS Monitoring in 2.5G and 3G networks consists of collecting/processing performance statistics, usage data and QoS related faults. In order to obtain end-to-end quality of service monitoring, the Network Elements, the ~~E~~element ~~M~~management ~~L~~layer~~system~~ and Network Management Layer~~OSS~~ **must** all be involved with the QoS Monitoring process. Alarm and performance collection is done at the Network Element layer and alarm/performance aggregation, report generation, and analysis is done at the ~~E~~element ~~M~~management and Network Management~~OSS~~ layers.

The following functions summarize the QoS Monitoring process:

- Manage QoS fault conditions received from Network Elements

- Retrieve QoS Performance data from Network Elements

- Collect and process usage data

- Generate QoS Reports – trend analysis of key QoS parameters

- Audit/Analyse collected QoS parameters against expected values

References that apply to QoS Monitoring and the following subclauses are listed in subclause D.1.4.2.

D.1.3.1 QoS Monitoring Conceptual Architecture

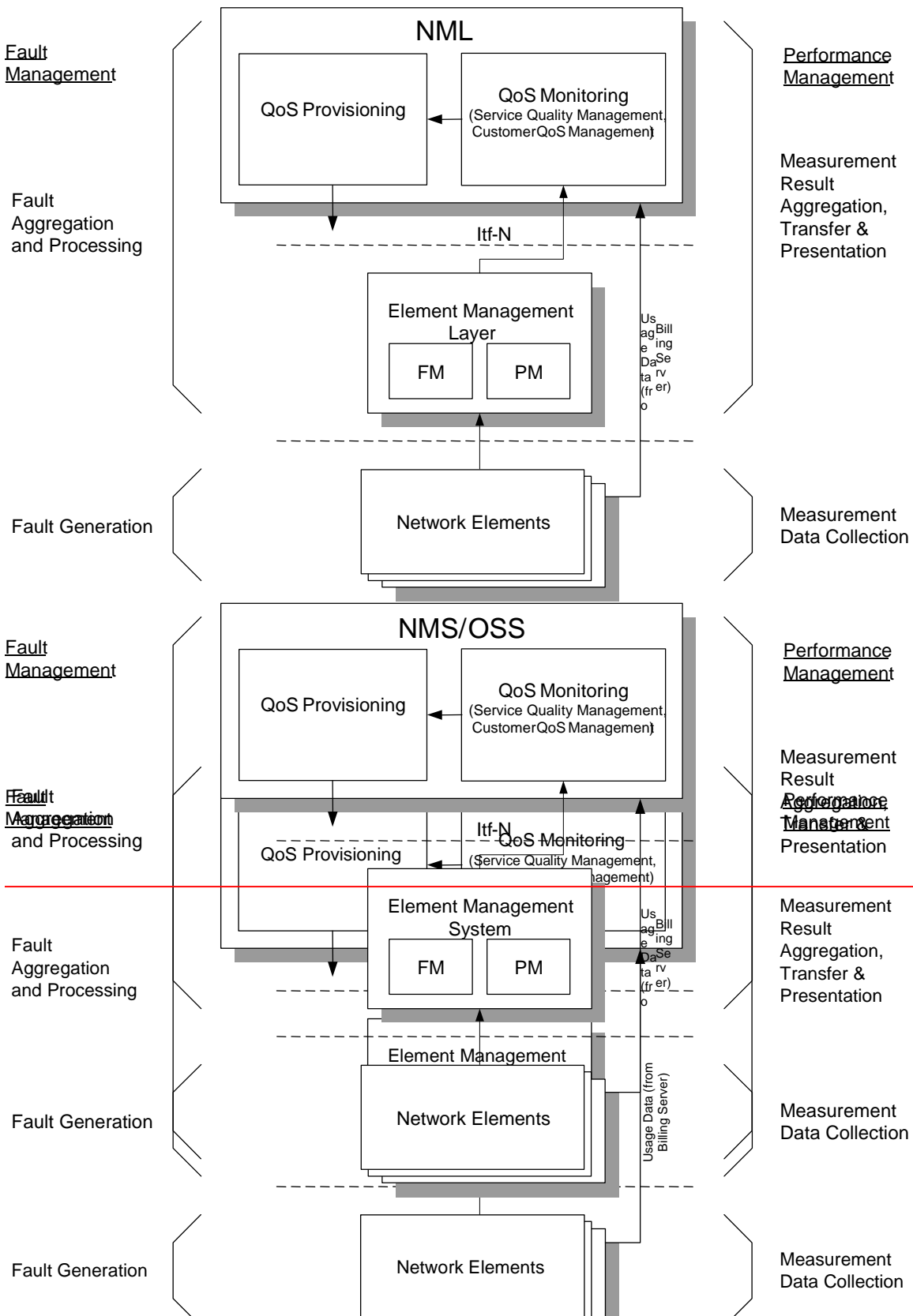The architecture of a QoS Monitoring system is shown in Figure D.3.

Figure D.3: QoS Monitoring

The architectural components identified in Figure D.3 are described in the following subclauses.

D.1.3.2 Network Element

The Network Element component is responsible for collecting performance measurements, usage data and generating alarms. The Network Element component can contain the Policy ~~Execution~~ Enforcement Point or the Policy ~~Distribution~~ Decision Point functions.

The Network Element component provides the following functions:

- Collect performance data according to the definition of the measurements and to return results to the EM~~S~~L~~S~~.

- Collect usage data and forward the data to mediation

- Perform the following fault management functions: Fault detection, Generation of alarms, Clearing of alarms, Alarm forwarding and filtering, Storage and retrieval of alarms in/from the NE, Fault recovery, Configuration of alarms.
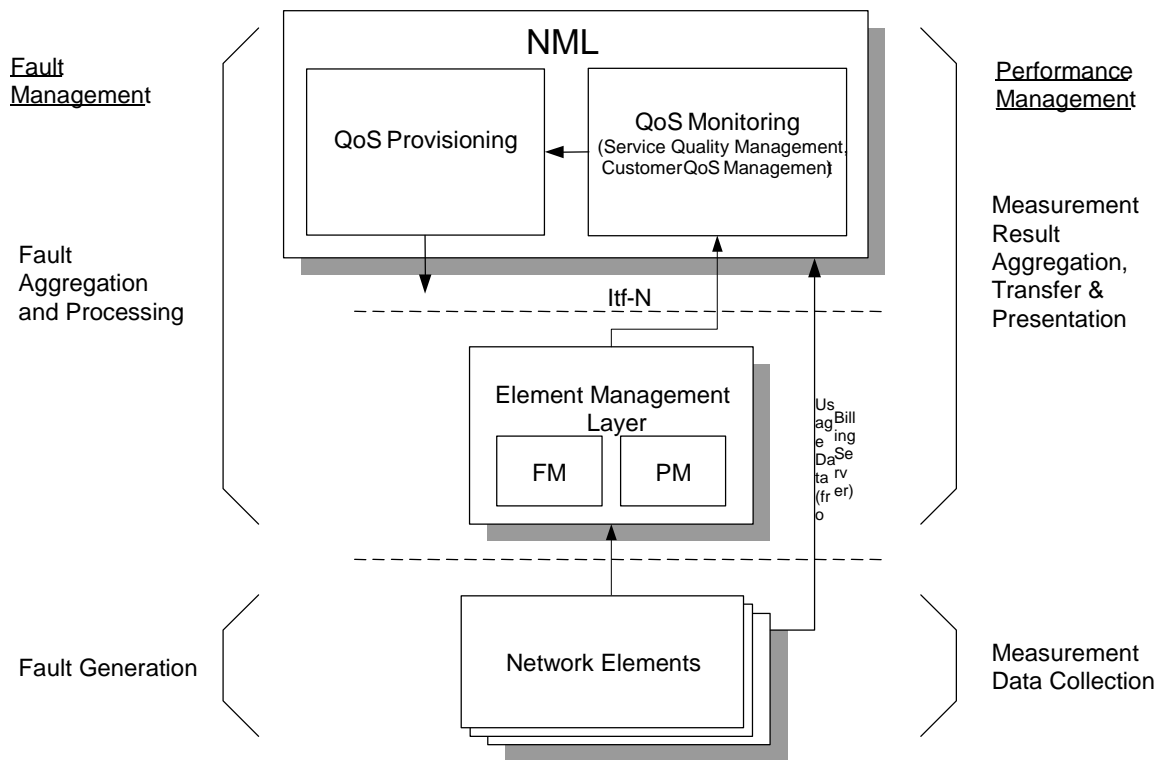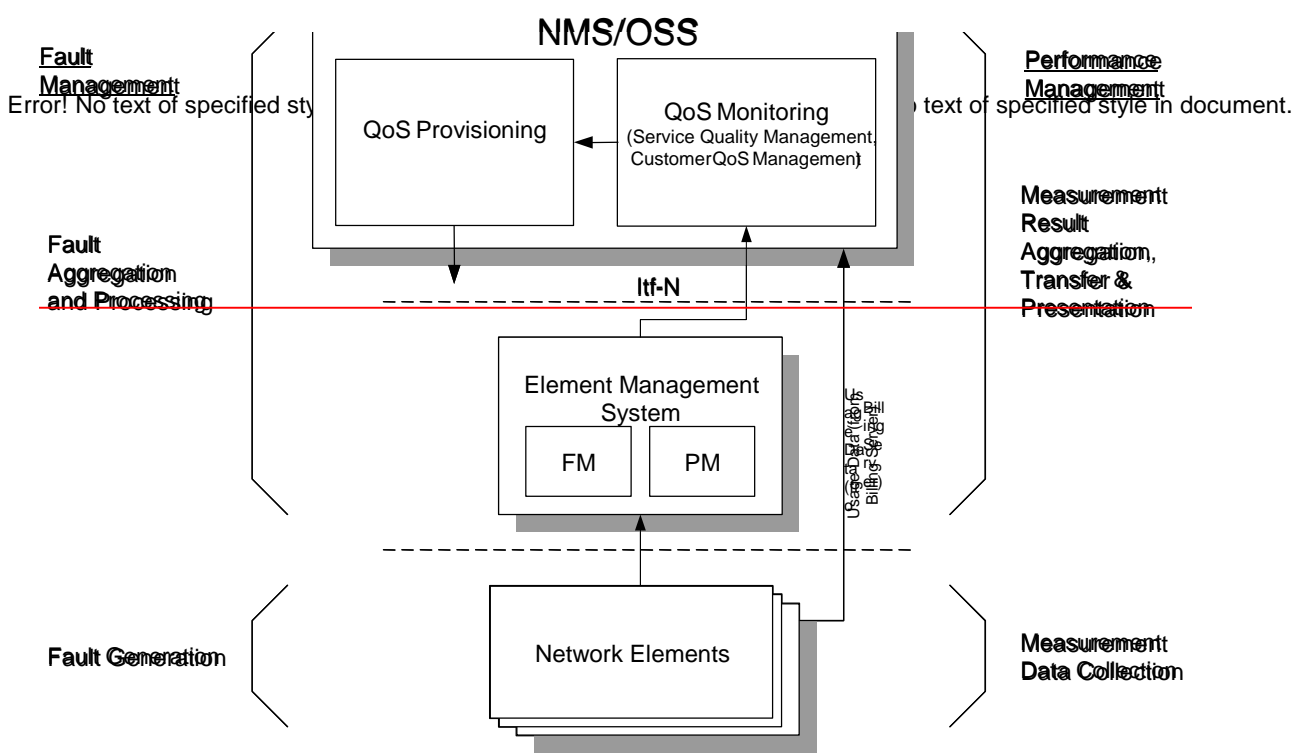
D.1.3.3 Element Management Layer~~System~~

The Element Management Layer~~system~~ is responsible for aggregating and transferring the collected performance measurements and generated alarms/events.

The Element Management Layer~~System~~ provides the following functions:

Performance Management

- Measurement data collection

  o Measurement types. Corresponds to the measurements as defined in 3GPP TS 52.402 and 3GPP TS 32.403, i.e. measurement types specified in the present document, defined by other standards bodies, or manufacturer defined measurement types;

  o Measured network resources. The resource(s) to which the measurement types shall be applied have to be specified

  o Measurement recording, consisting of periods of time at which the NE is collecting (that is, making available in the NE) measurement data.

- Measurement reporting

  o Measurement Report File Format Definition

  o The measurement related information to be reported has to be specified as part of the measurement. The frequency at which scheduled result reports shall be generated has to be defined.

- Measurement result transfer

  o Measurement results can be transferred from the NE to the EM according to the measurement parameters, and/or they are stored locally in the NE and can be retrieved when required;

  o Measurement results can be stored in the network (NEs or EM) for retrieval by the NM when required.

NMS/OSS

Fault
Management

QoS Provisioning

QoS Monitoring
(Service Quality Management,
CustomerQoS Management)

Performance
Management

Fault
Aggregation
and Processing

Itf-N

Measurement
Result
Aggregation,
Transfer &
Presentation

Element Management
System

FM   PM

Usage Data (from SS)
Billing Server

Fault Generation

Network Elements

Measurement
Data Collection

NML

Fault
Management

QoS Provisioning

QoS Monitoring
(Service Quality Management,
CustomerQoS Management)

Performance
Management

Fault
Aggregation
and Processing

Itf-N

Measurement
Result
Aggregation,
Transfer &
Presentation

Element Management
Layer

FM   PM

Usage Data (from Billing Server)

Fault Generation

Network Elements

Measurement
Data Collection

Fault Management

- Management of alarm event reports

  o Mapping of alarm and related state change event reports

  o Real-time forwarding of event reports

  o Alarm clearing

- Retrieval of alarm information

  o Retrieval of current alarm information on NM request

  o Logging and retrieval of alarm history information on NM request

D.1.3.4 Network Management ~~System (NMS)/ Operations & Support System (OSS)~~ Layer

From a QoS Monitoring perspective, the NM~~S/OSS~~L ~~layer~~ is responsible for the collection and processing of performance, fault, and usage data.

The NM~~S/OSS~~L QoS Monitoring layer provides the following functions:

- **Service Quality Management** – responsible for the overall quality of a service as it interacts with other functional areas to access monitored information, process that information to determine quality metrics, and initiate corrective action when quality level is considered unsatisfactory. Inputs to SQM include both performance and fault data.

- **Customer QoS Management** – includes monitoring, managing, and reporting the Quality of Service customers receive against what has been promised to the customer in Service Level Agreements and any other service related documents. Inputs to CQM include data from SQM and usage data.

D.1.4 QoS Management References

D.1.4.1 Policy Based QoS Provisioning References

The following documents apply to policy-based QoS provisioning:

1. IETF RFC 3060, "Policy Core Information Model – Version 1 Specification", Moore et al., February 2001. http://www.ietf.org/rfc/rfc3060.txt

2. IETF RFC 2251 Lightweight Directory Access Protocol (v3), M. Wahl, T. Howes, S. Kille, December 1997. http://www.ietf.org/rfc/rfc2251.txt

3. IETF RFC 2940 Definitions of Managed Objects for Common Open Policy Service (COPS) Protocol Clients. A. Smith, D. Partain, J. Seligson. October 2000. http://www.ietf.org/rfc/rfc2940.txt

4. IETF RFC 3084 COPS Usage for Policy Provisioning (COPS-PR). K. Chan, J. Seligson, D. Durham, S. Gai, K. McCloghrie, S. Herzog, F. Reichmeyer, R. Yavatkar, A. Smith. March 2001. http://www.ietf.org/rfc/rfc3084.txt

5. IETF RFC 2748 The COPS (Common Open Policy Service) Protocol. J. Boyle, R.Cohen, D. Durham, S. Herzog, R. Rajan, A. Sastry. January 2000, http://www.ietf.org/rfc/rfc2748.txt

6. IETF RFC 2753 A Framework for Policy-based Admission Control. R. Yavatkar, D. Pendarakis, R. Guerin. January 2000. http://www.ietf.org/rfc/rfc2753.txt

D.1.4.2 Policy Based QoS Monitoring References

The following documents apply to QoS monitoring:

7. 3GPP TS 32.101, 3G Telecom Management: Principles and high level requirements

8. 3GPP TS 32.102, 3G Telecom Management Architecture

9. 3GPP TS 32.401: Telecommunication Management; 3G Performance Management (PM)

10. 3GPP, TS 32.200 Telecommunication Management; Charging Management; Charging Principles.

11. 3GPP, TS 32.205: Telecommunications Management; Charging and Billing; 3G Charging data description for the Circuit Switched (CS) domain.

12. 3GPP, TS 32.215 Telecommunication Management; Charging Management; Charging Data Description for the Packet Switched Domain.

13. 3GPP, TS 32.600, Telecommunication Management; Configuration Management; 3G Configuration Management concepts and requirements.

14. 3GPP TS 32.111-1: Telecommunication Management; Fault Management; 3G fault management requirements

15. IETF RFC 959 File Transfer Protocol, J. Postel, J.K. Reynolds. Oct-01-1985. http://www.ietf.org/rfc/rfc0959.txt?number=959

16. IETF RFC 1901 Simple Network Management Protocol, v2, J.Case, K. McCloghrie, M. Rose, S. Waldbusser. January 1996. http://www.ietf.org/rfc/rfc1901.txt?number=1901

17. IETF RFC 2573 SNMP Applications. D. Levi, P. Meyer, B. Stewart. April 1999. http://www.ietf.org/rfc/rfc2573.txt?number=2573

18. IETF RFC 1907 Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2). SNMPv2 Working Group, J. Case, K.McCloghrie, M. Rose, S. Waldbusser. January 1996. http://www.ietf.org/rfc/rfc1907.txt?number=1907

19. TelemanagementForum (TMF) Telecom Operations Map (TOM), GB910, Approved Version 2.1, March 2000. http://www.tmforum.org/

20. TelemanagementForum (TMF) TOM Application Note, Mobile Services: Performance Management and Mobile Network Fraud and Roaming Agreement Management, GB910B, Public Evaluation Version 1.1, September 2000. http://www.tmforum.org/

21. TeleManagement Forum (TMF) NGOSS specifications http://www.tmforum.org/

22. 3GPP TS 23.207: End to End QoS Concept and Architecture

23. 3GPP TS 29.207: Policy Control over the Go interface.

3GPP TSG-SA5 (Telecom Management)
Meeting #26, Miami / FL, USA, 25 February - 1 March 2002

S5-020134
S5A020106r1

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CHANGE REQUEST

⌘ **32.101** CR **017** ⌘ **rev** **-** ⌘ Current version: **4.2.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Introduction of Subscriber and Equipment Trace Management	
Source: ⌘	SA5	
Work item code: ⌘	OAM-AR	***Date:*** ⌘ 01/03/2002
Category: ⌘ **B**		***Release:*** ⌘ REL-5

Use one of the following categories:
  F *(correction)*
  A *(corresponds to a correction in an earlier release)*
  B *(addition of feature),*
  C *(functional modification of feature)*
  D *(editorial modification)*
Detailed explanations of the above categories can
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Use one of the following releases:
  2   *(GSM Phase 2)*
  R96   *(Release 1996)*
  R97   *(Release 1997)*
  R98   *(Release 1998)*
  R99   *(Release 1999)*
  REL-4 *(Release 4)*
  REL-5 *(Release 5)*

Reason for change: ⌘	To introduce Subscriber and Equipment Trace Management into TS 32.101.
Summary of change: ⌘	A new clause (7.11) is added to introduce Subscriber and Equipment Trace Management
Consequences if not approved: ⌘	The specification will not contain any description of Subscriber and Equipment Trace Management

Clauses affected: ⌘	7.11 (new)

Other specs affected: ⌘	☐ Other core specifications	⌘	
	☐ Test specifications		
	☐ O&M Specifications		

Other comments: ⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7.11 Subscriber and Equipment Trace Management

Subscriber and Equipment Trace Management is a Feature that allows a Network Operator to activate/deactivate from the Network Management system the tracing of a particular subscriber within the network. Once activated the trace activity is reported back to the Network Management system. It will be possible to request activation of a trace from different Network Elements (via the appropriate Element Management Functionality) depending on the operators requirements. The activation/deactivation and reporting interface for Trace Management between the Network Management and Element Management Systems will be standardised using new and existent IRP Interfaces.

CR-Form-v5

CHANGE REQUEST

| ⌘ | **32.101** | CR **018** | ⌘ rev | **-** | ⌘ | Current version: | **4.2.0** | ⌘ |

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Proposed change affects: ⌘   (U)SIM ☐   ME/UE ☐   Radio Access Network ☐   Core Network **X**

Title:	⌘	Update of Accounting Management to cover the IMS (alignment with SA5's 32.200 Charging management; Charging Principles)
Source:	⌘	SA5
Work item code: ⌘	OAM-AR	**Date:** ⌘ 01/03/2002
Category:	⌘ **B**	**Release:** ⌘ REL-5

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP <u>TR 21.900</u>.

Use <u>one</u> of the following releases:
2   (GSM Phase 2)
R96   (Release 1996)
R97   (Release 1997)
R98   (Release 1998)
R99   (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	This TS does not correctly reflect the current status of SA5's charging TS 32.200.
Summary of change: ⌘		Replace section 7.9 with an appropriate text
Consequences if not approved:	⌘	TS is not aligned with SA5's charging TS 32.200

Clauses affected:	⌘	7.9

Other specs affected:	⌘ ☐	Other core specifications	⌘	
	☐	Test specifications		
	☐	O&M Specifications		

| **Other comments:** | ⌘ | |

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

2   References

[51]   3GPP TS 22.115: "Service aspects; Charging and Billing".

[52]   The Object Management Group (OMG) "The Common Object Request Broker: Architecture and Specification", Revision 2.1.

[53]   3GPP TS 32.400-series: "3G Performance Management Requirements".

[54]   3GPP TS 32.600: "3G Configuration Management - Concept and High Level Requirements".

[55]   3GPP TS 32.200 "Charging management; Charging Principles"

7.9   Accounting Management

3G call event data charging data descriptions will be based on the requirements specified in 3GPP TS 22.115 "Service aspects; Charging and Billing" [51] and on the charging principles outlined in 3GPP TS 32.200 "Charging management; Charging Principles" [55]. The main content of 3G call event charging data descriptions will be:

-    Layout and formats of raw call and event charging data records (CDRs) for the 3G switching core network nodes (circuit, and packet switched and IP Multimedia) and service nodes (e.g. MMS);

-    Data generation dependent on call states, chargable events and 3GPP TS 22.115 [51] service requirements;

-    Formal description of the call and event data records CDRs format in ASN.1 (ITU-T Recommendation X.680-1997 [49]) and definition of a file transfer mechanism (FTP).