Technical Specification Group Services and System Aspects **TSGS#22(03)0670**

Meeting #22, Maui, Hawaii, USA, 15-18 December 2003

Source: **Lucent Technologies**

Title: **Summary of e-mail discussion on organisation of charging work**

Document for: **Information**

Agenda Item: **4**

1. Purpose

An e-mail discussion has been held on the TSG SA reflector on how the charging work should be organised within 3GPP going forward. Section 2 states the current work organisation and section 3 outlines three proposals on how the work should be organised. This includes the "no change" option. Section 3 lists the reasons given in favour of and reasons given against each proposal.

2. Current Work Organisation

2.1 Description of current Work organisation

This paragraph gives a description of the current work split in the field of charging, in particular between SA1, SA2 and SA5

2.1.1. Charging related work in SA1

Main specification is TS 22.115: *Service Aspects Charging and billing.* It describes:

High-level requirements, e.g. requirement for Post- and Prepaid services

- 3rd party charging,
- inter-connect (inter operator) charging for different scenarios including WLAN
- shared network charging
- Charging based on media types, QoS, 2G/3G RAN access,

Guidelines for IP-Multimedia charging

- charging for sessions,
- charging for media components
- charging for content, location- und presence based charging
- M-commerce (transactions to 3rd party suppliers of goods & services) und portal-service
- roaming und interconnect charging
- 3rd parties

Guidelines for Pre-pay charging

Information contained in CDRs

In addition the different stage 1 specifications include individual chapters on charging. Usually it is details which aspects of charging are applicable to that service. In addition service specific charging requirements are addressed (e.g. registration in Presence).

Example: TS 22.233 (Streaming)

PSS should support various charging mechanisms, for example, time base charging, volume based charging, event based charging, content based charging.

It shall be possible to include the following streaming specific data, as a minimum, in the CDRs as charging information:

- streaming type (e.g. real-time or non real-time),

- volume of streaming content delivered

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It is similar with other service specifications (Presence, MBMS ...). As stated above IMS charging requirements are described in 22.115 and not in IMS stage 1.

2.1.2. Charging related work in SA 2

SA2 does not maintain charging architecture specifications, as this is considered SA5 SWG-B responsibility refer decision in SA#19: Overall architecture responsibility in SA2 and prime responsibility for charging architecture in SA5. Therefore charging aspects are also out of the scope of the overall architecture (23.002). This is similar to security aspects and SA3.

However SA2 specify the Overall architecture implications on Charging. An example being the IMS work with the *TR 23.815 Charging implications of IMS architecture.* Results of this has gone over to SA5 responsibility and are maintained in TS 32.225 in Rel-5 and TS 32.240 in Rel-6. Although only informative, the TR23.815 helped to lay basics for a high level charging architecture, which was then furthered in SA5 SWG B. Other examples of this SA2/SA5 work spilt and co-operation are WLAN and IP Flow bearer charging.

Similar to stage 1 specs, also stage 2 specifications address charging aspects to a certain extent (23.234 on WLAN, 23.060 on GPRS, 23.207 on QoS, 23.228 on IMS...).

2.1.3. SA5 SWG B

2.1.3.1 SA5 SWG B Specifications

The following gives an overview over SA5 SWG B specifications (starting Rel 5)

Release	contains Stage 2 aspects	contains Stage 3 aspects	Spec #	Spec Name
Rel-5	overall	-	32.200	Charging Architecture (Rel 4 onward)
Rel-5	X	x	32.205	CS Charging (Rel 98 onward)
Rel-5	X	x	32.215	PS Charging (Rel 98 onward)
Rel-5	X	x	32.225	IMS Charging (Rel 5 onward)
Rel-5	x	x	32.235	Application Charging (only MMS)
Rel-6	Generic	-	32.240	Charging Architecture
Rel-6	x	-	32.250	CS Charging
Rel-6	x	-	32.251	PS Charging
Rel-6	x	-	32.252	WLAN Charging
Rel-6	x	-	32.260	IMS Charging
Rel-6	x	-	32.270	MMS Charging

Rel-6	x	-	32.271	LCS Charging
Rel-6	messages Flows and scenarios	Message parameters	32.296	OCS Application and Interfaces
Rel-6	messages Flows and scenarios	Message parameters	32.297	CDR file transfer
Rel-6	-	x	32.298	CDR parameter definition
Rel-6	messages Flows and scenarios	Message parameters	32.299	Diameter applications

2.1.3.2 SA5 SWG B Work Plan

The current work plan identifies the following issues. It is organized such that it contains a feature charging management with three main building blocks related to bearer level, IMS and service domain.

Type	Tdoc	Title	Tdocs
CH	**SP-030047**	**Feature: Charging Management**	
WT	S5-024587	WT1: Interfaces to Billing Domain, Bx	TS 32.297 V0.4.0 see S5-034335
WT	S5-034021	WT2: OCS Interfaces Definition	TR 32.815 V2.0.0 see SP-030409
WT	S5-034547	WT3: OCS Application and Interfaces	TS 32.296 V0.0.1 see S5-034630
CH-BC	**SP-030048**	**BB1: Charging management for bearer level**	
WT	S5-034169	WT1: Align PS domain online charging with WLAN	
			TS 32.251 V1.0.0 see SP-030410
WT	S5-034170	WT2: WLAN offline charging	Tbd.
WT	S5-034171	WT3: WLAN online charging	Tbd.
WT	S5-034172	WT4: Alignment of charging specifications	TS 32.240 V0.4.0 see S5-034540
			TS 32.298 V1.0.0 see SP-030413
CH-IC	**SP-030049**	**BB2: Charging management for the IM Subsystem**	
WT	S5-034344	WT1: Split of TS 32.225 into separate	TS 32.260 V0.0.1 see S5-034623
		online and offline charging TSs	
WT	S5-034345	WT2: Enhancements to IMS charging	
WT	S5-034346	WT3: Analysis of implications on IMS	
		charging from service charging	
WT	S5-034347	WT4: Alignment of charging specification	TS 32.240 V0.4.0 see S5-034540
			TS 32.298 V1.0.0 see SP-030413
CH-SC	**SP-030050**	**BB3: Charging management for the service domain**	
WT	S5-034166	WT1: MMS enhancements	TS 32.270 V1.0.0 see SP-030412
WT	S5-034167	WT2: LCS Enhancements	TS 32.271 V1.0.0 see SP-030411
WT	S5-034168	WT3: Alignment of charging specifications	TS 32.240 V0.4.0 see S5-034439
			TS 32.298 V1.0.0 see SP-030413

2.1.3.3. Recent liaison activities

In order to see the relation of charging work with other activities please find attached a listing of liaison statements of SA5 SWG B with other groups

	CN	CN1	CN2	CN3	CN4	CN5	SA	SA1	SA2	SA3	SA4	T2	T3	G2	GSMA BARG CPWP	GSMA SERG	IEFT	OMA	ITU-T SG4	**Total**
SA5 - Meeting																				
2002																				
#29(06)		0/1		1/1	1/3			2/2	0/2	0/2	1/1	2/3	1/0		0/1		0/1			08 / 17
#30(08)		2/1		1/0	3/1	1/1		2/0	2/2	1/0	1/0	3/0			5/2				1/0	22 / 07
#31(10)		3/0		1/1	1/1				3/4		0/1				4/2	2/1				14 / 10
#32(11)	1/0	2/1			3/2			4/3	7/6	4/1	2/1	1/0	1/0		6/2	2/1				33 / 17
2003																				
#32bis(01)					0/1				1/0			3/0			2/1					06 / 02
#33(02)		0/1		2/0	2/2			2/1	5/3			0/1			2/0					13 / 08
#33bis(04)		1/1		0/2	0/1		1/0	1/1	5/2	1/0		0/1		1/0	1/1			1/1		12 / 10
#34(05)				1/1	0/1			1/1	3/1						1/0					06 / 04
#34bis(07)		1/2		1/1	1/1			2/0	4/0						1/1	1/1				11 / 06
#35 (09)			1/0		1/1		0/1	2/0	7/1	1/0		1/1			0/1	0/1		1/0		14 / 02
Total	1/0	9/7	1/0	6/5	12/14	1/1	1/1	16/8	37/21	7/3	4/3	10/6	2/0	1/0	22/11	5/4	0/1	2/1	1/0	
	31/28						65/36					13/6			30/17					
Joint Meetings						1			3			2			1					

x/y = incoming / outgoing

2.1.4. Charging related work in CN

TSG CN 1

CN1 work on IMS has to transfer various information in order to support correlation of charging information. These are the gcid and icid parameters and also the addresses of the charging functions, that came from the initial SA2,SA5 work. These parameters are covered in 23.218, 24.229 and RFC 3455 (P-Charging-Vector and P-Charging-Function-Addresses headers). The RFC was entirely developed by CN1 experts.

TSG CN 2

Pre-paid charging services using CAMEL are widely used.

TSG CN 3

CN3 specifies transport functions for the transfer of information relevant for charging:-

- between VMSC and GMSC for circut switched bearer services by ISUP

- between the P-CSCF and the GGSN (Go interface) by COPS-PR and

- between the GGSN and any AAA-Server (Gi interface) by RADIUS.

TSG CN 4

The Cx interface has charging IEs for charging functon names in 29.329 and 29.229, 29.060.

SA5 reutilises a version of GTP called GTP' for their charging work. Any GTP error messages have to be co-ordinated.

Charging characteristics are provided for MM and PDP contexts.

Charging Gateway addresses for IPv4 and v6 are made backwards compatible.

MNP pre-paid charging has been a big issue in CN4 (also using CAMEL).

2.2 Current concerns

During the discussions, no agreement could be reached on what the issues were. Any issues raised were only seen as “issues” by some companies. Also some issues raised related to a particular proposal, hence the concerns held by companies are captured in section 3.

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3. Possible Work Organisation

This section summarises the proposals made. Each proposal has a section describing the advantages as seen by the companies supporting it and a section describing the arguments against the proposal.

3.1 Proposal A – Keep the current structure

3.1.1 Description of work split and process

The work split and process is as described in section 2.1.

SA1 has responsibility for the development of the Charging Stage 1. It should be noted that in the past SA5 SWG-B has done some stage 1 work when charging expertise in SA1 is not available. SA1 should continue to be the interface between 3GPP and other external organizations such as GSMA and OMA regarding charging requirements. SA1 should co-operate with GSMA CPWP and OMA to ensure this. WG’s other than SA1 shall not agree charging requirements.

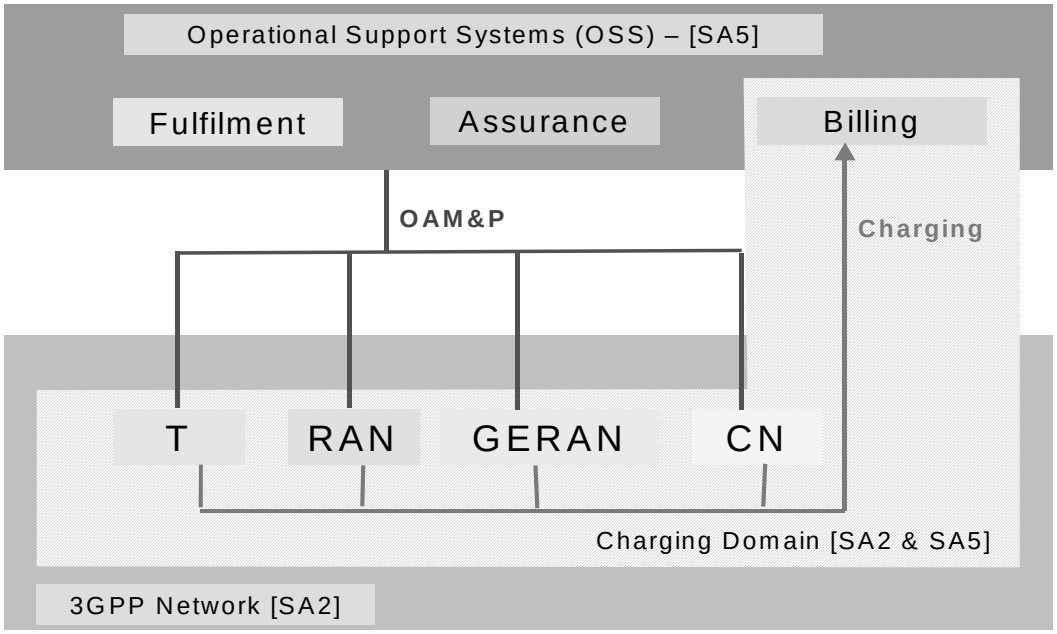


Figure 1: 3GPP Charging Flows and Domain

Figure 1 shows the current stage 2 work split between SA5 and SA2. The Charging and Telecom Management architectures which are the responsibility of SA5 are heavily dependant on the Network Architecture which is the responsibility of SA2. The Charging domain highlighted in figure 1 denotes the domain in which the charging architecture is specified, It is clear from this figure that stage 2 Charging responsibility should stay with SA5 and SA2.

3.1.2 Advantages of the proposal

The view of some companies is that OAM and Charging, clearly fall into the category of "Service and System Aspects" and hence that SA5 has responsibility for both. OAM and Charging both provide functionality for and interfaces to service providers/operators OSS and back-office systems for the purpose of service/subscriber/network planning/provisioning/monitoring as well as service/subscriber charging/billing. The interfaces to these OSS and back-office systems should be as common as possible and that is what SA5 is delivering (see figure 1 above). In addition, charging functionalities are not only part of the Core network but also part of the RAN/GERAN and Terminals and hence are correctly categorized as a SA function in 3GPP.

Charging is more than a couple of protocols. It requires certain expertise in charging functionality to specify charging in a way that fits to operator requirements. This is a strong argument to keep charging where the charging expertise is i.e in SA5 SWG-B. As SA5 has experience in both online and offline charging it can also be argued that it makes more sense to keep charging in SA5.

It should also be noted that SA5 already addresses Policy provisioning and monitoring aspects (see TS 32.101) therefore also has competence in this area, and as Charging Functionalities are not only part of the Core Network but also are part of RAN/GERAN and Terminals, some companies feel it would be undesirable to try and force charging work to be carried out in isolation in CN as these links could easily be missed.

Other points raised were:

- Regardless of the location of the charging group it will still be necessary to coordinate between SA1, SA2 and the charging group. The ease or difficulty of this coordination doesn't seem to be much impacted by whether the charging group is in SA or CN.
- Keeping the work within SA5 will continue the current focus of work on charging.

- Keeping Charging in SA5 will ensure that the coupling of OAM&P and Charging at the OSS Integration level is not ignored (see figure 1), Joint sessions and reuse of OAM&P functionality such as occurs today with the File Transfer Integration Reference Point (IRP) will be lost.
- The SA5 record and output of Charging Specifications is excellent and will deliver a Common online and offline Charging Architecture in 3GPP Release 6, "If its not broken why fix it ?"
- The resourcing of SA5 SWG B is now above the minimum acceptable level.
- Charging does require knowledge of issues other than the specific protocols and these skills are best represented in SA5 SWG B.

3.1.3 Disadvantages of the proposal

3.2 Proposal B - Move work from SA5 SWGB to a separate group within CN

3.2.1 Description of work split and process

SA1 proceeds with the generation of basic charging requirement, and SA2 with the overall architecture including charging. Then work within SA5 SWG-B is then transferred as a whole Working Group to CN. This ensures there is still a focal point for charging and on the other hand exploits synergies with other core network specification work.

3.2.2 Advantages of the proposal

Given the focus in SA5 on network management, charging is seen by some companies to be rather isolated within SA5. These companies see more potential synergies with CN groups, which the charging work could benefit from if placed with the environment of CN:

- CN has a deep understanding of the functions of the network, the interaction between various network elements and what information is carried in the protocols; expertise which should be considered very relevant to the work needed to be done for charging.
- The link between CN and IETF. The IETF is obviously based upon individual contribution. Nevertheless CN have, by necessity, gained in-depth knowledge of the workings of the IETF through 3GPP's use of the SIP and Diameter. A number of 3GPP delegates attend both IETF and CN. This close working by individuals has resulted in CN delegates having a good understanding of IETF philosophy. This understanding is necessary when utilizing and creating enhancements to IETF protocols.

However, charging is more than a couple of protocols. It requires certain expertise in charging functionality to specify charging in a way that fits to operator requirements. Hence the proposal by some companies to ensure that work shall not be distributed over various CN groups, if it is moved into CN.

In the past, SA5 has primarily worked on offline charging aspects (i.e. definition of CDRs) while CN2 has worked on online charging aspects (i.e. CAMEL). Non-IN prepaid charging was handled within SA5. This work division has resulted in different techniques being used for offline vs online charging, which is undesirable since how to charge for a service should be independent from whether the charging is performed offline or online.

Given that SA5 had no previous experience/expertise in online charging, it was agreed to initiate the IMS charging work in SA2 in order to secure a coherent definition of both online and offline charging capabilities. The same organisation of the work has subsequently also been applied for WLAN

charging and IP Flow bearer charging. This work split requires a close coordination between SA2/SA5 as well as that 3GPP member companies provide similar competence in both SA2 and SA5.

It should also be noted that IP Flow bearer charging has a strong relation to policy control, and currently the competence regarding policy control reside in the CN WGs. The CN WGs also holds the expertise in the protocols used for online IMS charging.

Keeping the work within one CN working group will continue the current focus of work on charging

- More efficient knowledge transfer between CN working groups and charging, meeting at the same place allows for face to face meetings of experts e.g.
  to harmonize policy control protocols for QoS and charging,

- More effective joint meetings between SA2 and CN if charging is included , e.g. knowledge transfer of the concept of MBMS-UE context can be used to work on GTP protocol as well as for PS domain charging enhancements.

- Better resource efficiency: in the current situation of Telco industry it is unlikely that additional stuff can be allocated to the charging group. But co-location with other related working groups will allow that temporarily additional experts will join charging meetings for particular topics, e.g.
  MBMS experts can join for MBMS charging while IMS experts can join for IMS Charging, Diameter protocol experts can help out where charging application experts need support on protocol details.

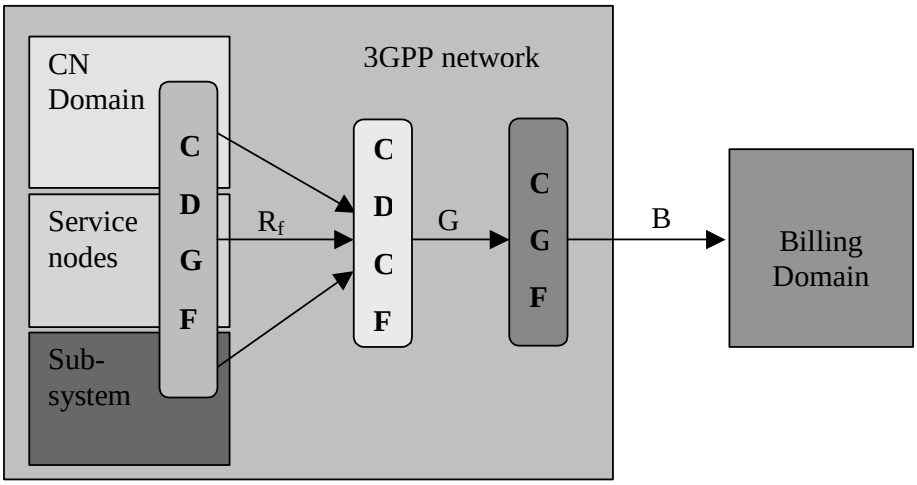
- SA5 (especially the plenary) can focus on OAM matters, what definitely requires skills and expertise different from charging.

- A clear work split between SA2 and Charging WG similar to other CN WG avoids misinterpretation and double work: SA2 produces a technical specification outlining the place of charging in the overall network architecture.

- The installation of a new CN WG would include MCC support

3.2.3 Disadvantages of this proposal

The view of some companies is that OAM and Charging, clearly fall into the category of "Service and System Aspects" and hence that SA5 has responsibility for both. OAM and Charging both provide functionality for and interfaces to service providers/operators OSS and back-office systems for the purpose of service/subscriber/network planning/provisioning/monitoring as well as service/subscriber charging/billing. The interfaces to these OSS and back-office systems should be as common as possible and that is what SA5 is delivering (see figure 1 & 2). In addition, charging functionalities are not only part of the Core network but also part of the RAN/GERAN and Terminals and hence are correctly categorized as a SA function in 3GPP.



CDGF: **C**harging **D**ata Generation **F**unction
CDCF: **C**harging **D**ata **C**ollection **F**unction
CGF: **C**harging **G**ateway **F**unction
BD: **B**illing **D**omain. This may also be a billing system/ billing mediation device

Figure 2: Overview of part of the common charging architecture as developed by SA5 SWGB (Release 6 TS 32.240)

When considering the interaction with billing vendors and other organisations the proposal to split the charging work into the traditional stages structure in 3GPP, would work against 3GPP members' interest.

- It will make it harder to interact with 3GPP on charging matters.
- It might create multiple charging architectures that will result in higher network cost.
- There will be a higher potential for "charging wholes" in the specifications.
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- It is true that a certain amount of skills related to specific protocols is common between CN groups and SA5 SWG B. However it is quite common in 3GPP for similar protocol technologies to be used in several parts of the system and this is not normally a justification for merging all the work in to one group.
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- Disruption and slow down of Charging Work: Moving a working group between SA and CN will cause an inevitable disruption to Charging work. The number of Charging meetings will be reduced by 50% (CN groups meet 4 times per year, SA5 meets 8 times per year) with a consequent slowing down of work.
- Confusion: Charging specification would most likely require another re-organisation and re-numbering post release 6, this would lead to inevitable confusion and cause maintenance problems
- Loss of Resources : A number of Charging experts who also work on OAM&P have indicated they will be forced to cease attending Charging meetings if the group is moved to CN, Liasions and joint sessions between SA5 and CN groups indicate very low interest and bandwidth for existing CN delegates to attend Charging sessions therfeore overall a reduction in Charging resources is expected overall by a move to CN.
- Loss of a Common Charging Architecture: Keeping Charging in SA ensures its correct categorization of Charging as a System aspect (similar to OAM&P and Security), Moving Charging to CN will ensure a focus on Core Network Charging to the detriment of RAN, GERAN charging and OSS Integration.
- The creation of a new CN WG will require additional MCC support

3.3 Proposal C – Concentrate all charging work within SA5

3.3.1 Description of work split and process

3.3.2 Advantages of the proposal

- Improve the relations with other entities such as billing vendors, GSMA, OMA.
- Attract charging experts from operators and other billing vendors.
- Generate a coherent charging framework and a better set of standards.

3.3.3 Disadvantages of the proposal

It is agreed that charging requires more than just protocol expertise, however it is felt by some companies that it would be undesirable to try and force the charging work to be carried out in isolation in a single working group, as the links with e.g. IP Flow bearer charging and policy control could easily be missed.

4. Recommendations