IN.08 SMS Hubbing Handbook
Version 2.0
7 May 2007

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Document History

<table>
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<tr>
<th>Version</th>
<th>Date</th>
<th>Brief Description</th>
<th>Editor Organisation</th>
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<tbody>
<tr>
<td>1.0</td>
<td>October 2006</td>
<td>New PRD IN.08 to support AA.71 SMS Hubbing Agreement</td>
<td>IWG</td>
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<tr>
<td>2.0</td>
<td>May 2007</td>
<td>CR001 to IN.08 – Addition FAQ section (IWG Doc 06_034) and CR002 to IN.08 – Change Unrestricted (IWG Doc 06_035)</td>
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Revision control and keywords

Other Information

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<th>Description</th>
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<tr>
<td>Document Owner</td>
<td>IWG</td>
</tr>
<tr>
<td>Revision Control</td>
<td>Semi-annual</td>
</tr>
<tr>
<td>Document editor/company</td>
<td>Éric Avizou, SFR</td>
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Feedback
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1 DOCUMENT PURPOSE

This document has been developed as an handbook to help Operators and their chosen SMS hubbing/transit Service Provider (SMSIP) to implement SMS Hubbing Services. The document supports the AA.71 Agreement for International SMS Hubbing Services and its SLA.

All acronyms within this handbook are taken from the AA.71 Agreement for International SMS Hubbing Services.
2 SMS HUBBING VERSUS BILATERAL APPROACHES

Today, in order for Operators to implement an SMS Interworking relationship between them, there are two technical and commercial solutions:

A Bilateral solution - in which both Operators have a direct relationship for network use, charging and billing.

A Hub service solution - where interworking of SMS traffic between Operators is implemented and operated through a centralised SMS platform called Hub or Relay.

Hub Services are a turn key system which allows operators to send and receive SMS messages to multiple destinations globally, rapidly establishing Interworking relationships by using only one connection and one contract.

Based upon the experience from bilateral approach to SMS Interworking and acknowledging the high number of potential Interworking partners (e.g. +600 GSM operators), the use of bilateral connections for the implementation of SMS Interworking relationships does not appear to be an effective solution since it will be slow and resource hungry given the amount of work required for launch, such as negotiation of the agreements and individual operator testing.

On the contrary, the SMS Hubbing Service appears to be a more efficient and effective solution for SMS Interworking between Operators and is seen as a key enabler to allow Operators to develop the take up of SMS as a mass-market service.

In addition to this gain of efficiency created by the possible migration from Bilateral approach to SMS Hubbing Service for current GSM SMS Interworking relations, the utilization of SMS Hubbing Service could be seen on a second stage as a way to:

- enable connectivity between GSM Operators and non GSM Operators (Mobile to Mobile)
- enable connectivity between Mobile Operators and non mobile Operators (e.g fixed operators)
There is a business case for using a hub approach as opposed to setting up and managing multiple bilateral agreements. An overview of this is given below.

Figure 1: Bilateral arrangement potentially requiring the set-up and management of 100’s of connections.

Figure 2: Single connection and contract with the hub.
### Bilateral

**Advantages**
- Direct relationship with other Operators

**Disadvantages**
- Have to set-up and manage many connections
- Highly resource intensive and more costly to operate on an on-going basis (e.g. potentially to 600+ Operators)
- Slow to deploy, namely for new entrant Operators (seen as low priority by third parties)

### Hub

**Advantages**
- One stop shopping
- Quick to deploy giving rapid access to many potential interworking partners (not limited to GSM operators)
- Less commercial and technical resources required
- Enabling interworking between Operators using different technologies.

**Disadvantages**
- Risks associated with the hub being a not mature system (on a global basis)
- Loose of close relation with interworking partner that was achieved through Bilateral approach

<table>
<thead>
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<th>Bilateral</th>
<th>Hub</th>
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*Table 1 – Advantages and Disadvantages of the Hub and Bilateral Approaches*

It is however noted that both the Bilateral Interworking and Hubbing approach may co-exist.
3   MINIMUM HUBBING SERVICE REQUIREMENTS

Any Operator (the Customer) requesting the provision of SMS Hubbing services on
the market shall expect to receive as a minimum the following facilities from the
SMSIP:

3.1 Traffic Transmission and Interconnection with Third Party
SMSIPs = End to End Transmission

For the avoidance of doubt, this means traffic transportation (delivery) from the
Originating Operator’s Network to the Recipient Operator’s Network.

The Recipient Operator might be a direct customer (Client Operator) of the SMSIP or
a customer of a Third Party SMSIP. In the case of the recipient using a Third Party
SMSIP, it will be the first SMSIPs responsibility to ensure connection with the
Recipient Operator’s SMSIP to guarantee traffic termination. SMSIPs are expected to
inter-operate openly with each other; hence all-to-all connectivity is made possible.

The SMSIP shall implement all necessary interconnections with any Third Party
SMSIPs compliant with Open Conectivity (OC) High Level Requirements within a
reasonable timeframe to ensure the customer will have Interworking with ALL
Interworking partners made available through the SMSIP. Such implementation shall
be naturally included in the price charged by the SMSIP to the Client Operator for the
Service, i.e. shall not originate additional or specific charges for the interconnection
set-up toward the operators already connected to the SMSIP, compliant with OC
High Level Requirements.

This means that transportation through any Third Party SMSIP, if needed to
terminate the traffic in the Recipient Operator’s Network, is part of the service
rendered by the SMSIP to the Client Operator.

It is anticipated that the price charged by the SMSIP to the Client Operator shall not
depend on the fact that the message is transited directly to the
destination/terminating Operator or by a Third Party SMSIP or on the number of Third
Party SMSIPs used to reach the destination/terminating Operator.

The traffic exchanged between the Originating Operator and the Recipient Operator
through the SMSIP shall have to be transmitted end-to-end through a maximum of
two SMSIPs (see diagram below – figure 3 - indicating a maximum of two SMSIPs
between the traffic origination point (yellow dot) and the traffic termination point
(yellow dot) with the SMSIPs responsibility covering the whole yellow path.

A third SMSIP may be involved in the traffic termination only in the case where it is
needed to properly manage Mobile Number Portability and/or Roaming.
3.2 Quality End to End

When using SMS Hubbing Services, the operators shall get a commitment by the SMSIP on the QoS/level of performance for end-to-end traffic transmission (i.e. from the network where the traffic has been originated to the network where the traffic has to be terminated) irrespective of the fact that the traffic has been transmitted through one or two Third Party SMSIPs.

The SMSIP shall deliver to the Client Operator reports on the QoS measured on the End-to-End service offered to the Client Operator.

Such reports shall include also the levels of performance registered on any Third Party SMSIPs where involved in the delivery of the Client Operator’s traffic.

The recommended levels of performance on hubbing services, period of analysis and the details on the content of the QoS reports are contained in section 11 hereto and in the SLA attached to the AA71 PRD.

3.3 Transparency

The SMSIP System shall capture and transfer to the Client Operator, information regarding every SMS transaction, enabling the hubbing service to provide accurate and detailed billing information to the Client Operator.

In order for the Client Operator to control and prepare statistics of the Interworking traffic terminating in its network, the SMSIP shall transparently transmit to the Client Operator all details of the SMS traffic, including information on the originating number and originating Operator, as described in OC SMS Hubbing technical Architecture,
In the event of investigation or analysis required, the SMSIP shall facilitate this and provide the requested info to the Client Operator.

The SMSIP shall also provide to the Client Operator all information on the Third party SMSIPs involved in the traffic delivery, in order to fulfil the routing transparency and service trouble shooting OC High Level Requirements.

The SMSIP shall never manipulate any content, message format or any information related to the SMS transmitted through its platform, except whenever conversion is necessary to terminate the SMS.

The SMSIP shall also provide the customer a breakdown of all elements that compose the Service charge (i.e. Termination Charges and Transit fees), so that the Client Operator can always have visibility of the pricing components applied to the hubbing service.

3.4 Contract Aggregation

The SMSIP shall include in the contract with the Client Operator the relationship required with any Elected Participating Operators and any involved Third Party SMSIP to ensure the proper termination of SMS Traffic and therefore the proper functioning of the SMS Interworking Service.

It is expected that the Customer will just need to negotiate and sign one contract with the SMSIP / Hub, using the GSMA AA71 in order to have contractual relationships with all Operators directly connected to the SMSIP and to any Third Party SMSIP directly connected to the SMSIP.

3.5 Cascade Billing

The SMSIP shall comply with a cascade-billing model (as per the current voice model). The SMSIP shall manage in total the billing and financial relationship with the Recipient Operators and the Third Party SMSIPs.

The Client Operator shall have a sole billing and financial settlement relationship, that is the one with the SMSIP.

As detailed in section 9 hereto, it is the responsibility of the SMSIP to establish the appropriate billing arrangements with all the parties involved in the traffic delivery, to ensure that the end-to-end service works in a transparent manner.

3.6 Testing

The SMSIP shall perform all end to end tests described in the relevant PRD and will ensure that the Interworking between the Originating and Recipient networks is functioning correctly.

The Client Operator will always have the option to outsource some or all of the end-to-end testing to the SMSIP or to perform them on his own.

Rules on testing are detailed in section 7 hereto.
3.7 Security

It is the SMSIP’s responsibility to put in place all tools and functionalities (e.g. anti-spam, anti-virus, proxys, etc.) needed to comply with the anti-frauds and anti-spam procedures described in the AA71 agreement. SMSIP’s are expected to implement the most advanced anti-fraud, anti-spamming, anti-spoofing, and anti-faking capability.

3.8 Delivery Report functionalities

The SMSIP shall transmit to the Operator real time Delivery Report at no extra charge.

Information on the reports delivered by the SMSIP to the Client Operator are detailed in section 8, 9 and 10 hereto and in the SLA attached to the AA71 PRD.
4 ACCESS AND CONNECTION METHOD

Regarding the access and connection method setup between the SMSIP System and the Client Operator System, The SMSIP will provide the SMS Hubbing Service based on both kind of connectivity/technology: SMPP and SS7.

The Parties shall mutually determine and agree upon the appropriate method of interconnection, i.e. SS7 or IP.

The responsibility over the connection between the SMSIP and the Client Operator will be dependent upon the way such connection has been agreed by the Parties and consequently established.

When SS7 is the connectivity option chosen, a prerequisite to the SMS Hubbing Service provision is a connection to either the SMSIP’s signalling service, or to the signalling service of a third party signalling provider connected to the SMSIP’s network. The usage of SMS Hubbing Service offered by an SMSIP does not imply that the Client Operator is using also the signalling service of that SMSIP.

Furthermore when both the Originating and Recipient Operators are connected to an SMSIP through SS7, the SMSIP and the Third Party SMSIP will also connect through SS7, as illustrated in table 2 of this section.

When IP is the connection method chosen, a prerequisite to the SMS Hubbing service provision is a connection to either the SMSIP’s IP transit service, or to the IP transit service of a Third Party IP provider connected to the SMSIP.

<table>
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<tr>
<th>Connection Type</th>
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<td>Connection Inter SMSIP is SS7 or IP</td>
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<tr>
<td>Operator B</td>
<td>Connection Inter SMSIP is SS7 or IP</td>
<td>Connection Inter SMSIP is SS7 or IP</td>
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Table 2 – Relation between connection method established between Operators and SMSIPs and connection method established between SMSIPs
5 AA.71 AGREEMENT FOR INTERNATIONAL SMS HUBBING SERVICES

As with any market, true efficiency can only be achieved in an open and competitive environment. Therefore, operators shall have the choice to freely choose their hubbing services provider and to change them from time to time in a similar way to what currently happens with international voice carriers.

In order for this model to succeed, it is highly important to have a single standard set of open, ubiquitous and transparent commercial and technical parameters.

The AA71 outlines these requirements and thus creates an environment, which should minimise the costs and complexity of switching.

There is a danger that if operators decide to proceed with fragmented agreements rather than the AA71, the ability to switch between hubbing providers may be unnecessarily complicated and expensive.

The AA71 is a template agreement to be used as reference by those operators willing to negotiate a contract with an SMS Hub to get SMS Hubbing Services.

The uptake of document AA71 by the community of GSMA members and by the providers of SMS Hubbing Services will ensure that an open, secure and standardised environment for hubbing services is created. This will allow the SMS Hubbing Service providers to efficiently and effectively respond to Operators’ needs, enabling a reduced time to market for services tailored to subscriber’s needs.

The main principles of the agreement are as follows:

- To provide global connectivity for Interworking. See section 2 hereto
- To provide transparency and clarity on charging. See section 9 hereto
- To employ cascade billing (similar to voice). See section 9 hereto
- To provide high quality, end to end interoperability with clear performance targets. See section 11 hereto

As mentioned earlier, the SMS hub is a first step along the road to allow mobile operators to deliver data based services to their consumers.

To this aim and key to any take up of services is the creation of an efficient delivery environment based on open standards. Hence the SMS Hubbing Service.
6 SMS HUBBING SERVICE COMMENCEMENT AND SMS INTERWORKING COMMENCEMENT

The AA71 differentiates between several types of “starting date” that are explained in the next paragraphs.

6.1 Effective Date

The “Effective Date” represents the moment in time (dd/mm/yy) when the Agreement between the parties is signed.

6.2 SMS Hubbing Service Commencement

SMS Hubbing Service Commencement Date represents the moment in time when a working connection between the Operator and the SMSIP for the provisioning of the SMS Hubbing Service is established for the first time.

Typically, the SMS Hubbing Service Commencement Date is in conjunction with a number of SMS Interworking Dates for a number of specific SMS hubbing destinations/SMS Interworking Partners that have been listed by the Client Operator as Elected Participating Operators.

In that case, this date could also represent the start for charging MRCs (monthly recurring charges), in case such type of fees have been agreed between the SMSIP and the Client Operator;

6.3 SMS Interworking Commencement Date (Service Commencement Date)

The practical understanding of the “SMS Interworking Commencement Date” is the moment in time, where SMS Interworking between two particular Operators via the SMS Hubbing Service of one or two involved SMSIPs is activated for the first time.

In other words, within the term of any Agreement for SMS Hubbing Services there will be only one Effective Date, one SMS Hubbing Service Commencement Date and many SMS Interworking Commencement Dates since one per SMS transit destination is required.

Typically, the SMS Interworking Commencement date also represents the date, from which onwards event based charges in relation to the respective SMS transit destinations can be charged.
7 TESTING

One of the primary arguments for the value of an SMS Hubbing Service is a significant reduction of Operators’ effort required for administration, implementation, testing and operation of SMS Interworking, when compared to the alternative of multiple bilateral implementations.

In terms of testing this can mean that the Operator has the option of outsourcing some or all of the testing involved in the activation of Interworking to the SMSIP as part of the SMS Hubbing Service, thus reducing the overall implementation efforts significantly. Of course, Operators are free to run testing on their own account to the extent, they deem most appropriate.

7.1 Testing Prior to the Service Commencement Date

Prior to live service, all performance for the SMS Hubbing Service, including the billing process and the service management procedures, have to be tested and validated.

In order to achieve fault free interoperability between all Participating Operators, specific importance has to be given to the initial testing phase that precedes the Service Commencement Date of the overall service.

Therefore, as a first step, the SMSIP and the Operator need to run a joint initial test sequence where the respective test plan shall follow the GSMA technical recommendations.

The objectives of initial testing prior to the Service Commencement Date is:

- To determine any anomalies or specific settings by the Operator or the SMSIP and defining all necessary remedies
- To prove successful technical implementation of bi-directional connectivity between the parties
- To test the capability of the SMSIP to operate as mediator between all connected Operators
- To test the SMS Termination Service offered by the Operator with the SMS Hubbing Service offered by the SMSIP under controlled conditions

This initial test sequence represents a two-way acceptance test for the SMS Termination Service offered by the Operator and for the SMS Hubbing Service offered by the SMSIP.

7.2 Testing Prior to Commencement Dates

Before declaring a Commencement Date with regard to a particular SMS hubbing destination, it is the responsibility of the SMSIP to supplement the initial testing with true E2E (End-to-End) service testing.

This E2E service testing shall follow the GSMA technical recommendations.
These tests shall be performed by the SMSIP using the test numbers (i.e. SIM cards) of the two involved SMS hubbing destinations (Operators between whom SMS Interworking must be activated) but could be without their direct participation.

The participation of the Operators could only be required in case the E2E testing doesn’t deliver satisfactory results.

If the respective two involved SMS hubbing destinations are not directly connected to the same SMSIP, the E2E test shall be performed with the cooperative effort of the two involved SMSIPs.

The Operators may additionally run independent E2E testing if deemed appropriate.

The objectives of E2E service testing prior to Commencement Dates is:
- To test the SMS Termination Service offered by the far end Operator (or applicable recipient network – check references)
- To test interconnection relation between the involved SMSIPs, where appropriate
- To prove successful implementation of SMS Interworking between the involved two SMS hubbing destinations
8 ELECTION AND ACTIVATION OF PARTICIPATING OPERATORS

8.1 Election of Participating Operators

Within the context of the AA.71, the term Participating Operators is used to describe all SMS hubbing destinations that are available to a Client Operator through its SMSIP at a specific point in time. In this context, it is irrelevant whether those SMS hubbing destinations are all directly connected to the same SMSIP or via peering.

The list of Participating Operators, available via a particular SMSIP, shall change each time a new Operator is connected to the SMSIP or new interconnections with Third Party SMSIPs are established.

Therefore, it is the responsibility of the SMSIP to provide the Client Operator with a continuously updated list of Participating Operators (Annex 10 of the Agreement “Participating Operators and Participating Operators Termination Charges”).

Using this list the following information shall be provided to the Client Operator:

- The names of all available Participating Operators accessible through the SMSIP directly or indirectly (i.e. through Third Party SMSIP(s)) where the new Participating Operators are specifically highlighted
- The Participating Operators Termination Charges: In the currency of the Participating Operator; and In the Invoicing Currency; together with the exchange rate used for any necessary conversions, as indicated in AA71.
- All relevant configuration and service parameters of the Participating Operators (as applicable to SMS and listed in Annex 11 of AA71)

Updates to the AA71 Annex 10 and 11 shall be made only once during each calendar month and at least 7 days before the start of each invoicing period.

The SMSIP shall ensure that all Participating Operators included in its List, namely the ones made available through Third Party SMSIPs are accessible in compliance with all the requirements mentioned in section 3 of these guidelines.

The term Election is used to describe the act of selecting those Participating Operators to whom the Client wishes to offer its SMS Termination Service for SMS Interworking via the SMSIP.

A typical example where a Client Operator may not elect a particular Participating Operator offered by the SMSIP could be a destination where bilateral SMS Interworking between the involved Operators has already been established beforehand.
8.2 Election Communication Process:

The Client Operator will agree with the SMSIP whether they use option A (Opt-IN) or option B (Opt-OUT) for elections process of participating operators, as described in the AA71 Agreement.

If it is agreed that Option A is implemented, upon receipt of the list of Participating Operators from the SMSIP, the Client Operator will respond in x days to the SMSIP which Operators they wish to connect (Elect) with SMS Interworking starting in the next invoice period. If the Client Operator misses the window for the next invoice period, any Elections they make will be implemented for the following invoice period, unless otherwise agreed between the Client Operator and the SMSIP.

If it is agreed that Option B is implemented, upon receipt of the list of Participating Operators sent by the SMSIP, the Client Operator has X days to respond to the SMSIP indicating those Participating Operators with whom the Client Operator does not want to connect with. If no communication is received by the SMSIP in such a timeframe, the SMSIP will implement all new Participating Operators in its list for starting of SMS Interworking with the Client Operator, within the next invoice period, unless otherwise agreed between the Client Operator and the SMSIP.

The choice between A (OPT-IN Mechanism) or B. (OPT-OUT Mechanism) is agreed between the Client Operator and the SMSIP at the signature of the Agreement and can be changed at any time upon a new written agreement between the Parties.

The Client Operator may from time to time ask the SMSIP to establish the connection with Operators who are not listed by the SMSIP as Participating Operators. This will be delivered to the SMSIP as a list and a response period will be agreed between the Client Operator and the SMSIP. This response from the SMSIP will include the answer upon the SMSIP’s time for connection with such Operators as well as the latter’s willingness to become Elected Participating Operators of the Client Operator and the relevant economic conditions for SMS Hubbing service towards such destinations..

8.3 Activation of SMS Interworking to an Elected Participating Operator

Regardless of the Election method, it needs to be noted that within the current technical framework, the activation of SMS Interworking via the SMS Hubbing Service may require the Client Operator and the SMSIP to implement a set of configuration parameters on their network systems per each SMS hubbing destination.

It is the responsibility of the involved SMSIPs to find a mutually acceptable Commencement Date (for any pair of Operators involved in the SMS Interworking relationship), as well as to co-ordinate the pre-launch activation and testing processes.

Same rule shall apply to the SMS Interworking de-activation process between the Client Operator and any Elected Participating Operator.
9 SMS INTERWORKING – CHARGING & BILLING PRINCIPLES

9.1 General Principles

9.1.1 Transparency

The SMSIP will transport and handle the Client Operator’s traffic end-to-end in a transparent way. Transparency must be granted by the SMSIP on:

- On the Routing:

  The routing used by the SMSIP to deliver the Client Operator’s traffic must be made transparent to the Client Operator (either online or offline). All parties involved in the delivery of the Client Operator’s traffic shall be fully visible to the Client Operator.

- On the Charging:

  The pricing applied by the SMSIP to the Client Operator will transparently show all price components. This means that Operators’ Termination fees and the SMS Transit Charge shall be fully visible to the Client Operator.

  Without full transparency of the Termination Charges associated with each Elected Participating Operator, there is a risk that SMSIPs may charge inappropriate additional Transit Charges.

  This means that the SMSIP shall not combine the Elected Participating Operator’s Termination fees and the SMS Transit charges related to the supply of the SMS Hubbing Service to the Client Operator. In this context means a clear split, at an invoice level, between the Elected Participating Service Providers’ Termination rates and other Service charging components defined and agreed between the Parties.

- On the Originating Operator:

  Transparency on the Originating Operator is required to minimise spamming, spoofing and frauds and to ease trouble shooting processes.

9.1.2 Cascade Billing

Cascade Billing offers a Client Operator the opportunity to receive a single invoice from the SMSIP for all incoming or/and outgoing SMS traffic on their network.

The ability of the international carriers to apply cascade billing internationally for different currencies is already a key enabler for international voice traffic and this is a key commercial principle underpinning the hubbing service concept.

Hence, the AA71 seeks to implement the model, which has been successfully proven in the circuit switched voice world. Specifically the AA71 states that:
The Termination charge is passed from the Originating Operator to the Recipient Operator via the SMSIP in a transparent manner (with full details contained in the SMS BULK Data)

The Client Operator quotes its Termination Charge to the SMSIP on a per Elected Participating Operator basis

The SMSIP shall ensure transparency on the Elected Participating Operator termination. Transparency in this context means a clear split, at invoice level, between the Elected Participating Operator’s termination rates and other SMS Hubbing Service charging components associated to the SMS Hubbing Service rendered by the SMSIP to the Client Operators (i.e. transit fee on a per message basis).

Today’s interconnection between SMSIPs will have to develop into a more appropriate commercial interconnection, including Inter-carrier settlement, in the near future. This will require the SMSIPs to interconnect to one another and offer a single ubiquitous service to operators regardless of the geographic location of the Interworking partners.

In summary, the SMSIP shall invoice the Client Operator for the SMSIP Transit charges and the Elected Participating Operator Termination charges in respect of all Chargeable Events, which have taken place during “the monthly Invoice Period” in a transparent mode.

Transparency in this context means a clear split, at invoice level, of the Transit Charges or any other charging components that may constitute the remuneration of the SMSIP for the Service and the Termination Charges of the Elected Participating Operators.

9.1.3 Transit Charges

The SMSIP Transit Charges quoted to the Client Operator to establish SMS Interworking with an on-net Participating Operator (i.e. a SMSIP direct customer) shall be the same as those applied by the SMSIP to reach an off-net Participating Operator (i.e. through interconnection with a Third Party SMSIP).

The amount charged by the SMSIP to the Client Operator should not depend on the number of SMSIPs used to transit and terminate the SMS (in the case where the traffic to/from the Operators is routed via Third Party SMSIP(s)).

The SMSIP shall transfer to the Client Operator all information and details needed by the Client Operator in a transparent format to allow a proper reconciliation of the monthly invoice.

9.1.4 Termination Charges

For each Elected Participating Operator, the Client Operator acting as a Recipient Operator shall quote to the Originating Operator an SMS Termination Charge,
It is the responsibility of the SMSIP to notify all Elected Participating Operators (SMSIP’s direct customers) and the Third Party SMSIPs of the Client Operator’s Termination Charges.

Each Client Operator shall communicate and update its Termination Charges to the SMSIP through a price list from time to time.

The price list will follow the procedure below:

The Client Operator acting as a terminating operator (Recipient Operator) shall notify the SMSIP of its Termination Charges at point of signature of the AA71 using Annex 8.

The Client Operator shall communicate to the SMSIP any increase of Termination Charges at least ninety (90) calendar days in advance of such revisions becoming effective, unless the revision is at the request of the Client Operator’s national regulator in which case the Client Operator should notify the SMSIP as soon as is practicable.

The SMSIP shall notify its Participating Operators (direct customers or via the Third Party SMSIPs) of any increase in the Termination Charges of the Client Operator at least eighty (80) calendar days prior to such revision becoming effective.

The SMSIP or Third Party SMSIP shall notify its Participating Operators of any increase in the Client Operator Termination Charges at least sixty (60) calendar days prior to such revisions becoming effective.

The Client Operator may reduce all or any of its Termination Charges at any time upon written notice to the SMSIP.

The SMSIP shall pass on any reduction of the termination charges of a Client Operator to all other Elected Participating Operators without undue delay.

Similar communication procedure will apply in the case where the Client Operator is the Originating Operator (see also Section 9.2.1 hereto).

9.1.5 SMS Interworking Scenarios:

Associated to the service provided by the SMSIP to the Client Operator, we can have the following several traffic flow scenarios:

A) SMS Terminated sent by the SMSIP onto the Client Operator network

Scenario 1: SMS sent by the SMSIP to the Client Operator’s Customers registered on the Client Operator’s network.

Scenario 2: SMS sent by the SMSIP to the Client Operator’s Customers, roaming in another Operator.

B) SMS Terminated sent by the Client Operator to the SMSIP:
Scenario 3: SMS are sent by the Client Operator to the SMSIP and delivered by the SMSIP to the Elected Participating Operator in case the Recipient Device is registered on the Elected Participating Operator’s network.

Scenario 4: SMS are sent by the Client Operator to the SMSIP and delivered by the SMSIP or a Third Party SMSIP to the Operator (actual destination network) where the Recipient Device of the Elected Participating Operator is registered.

The following charges shall apply:

Scenario 1: The Client Operator (HPMN) Termination Charge as set out in Annex 7 of AA71;

Scenario 2: The Client Operator (acting in this case as HPMN) Termination Charge set out in the relevant annex of AA71 should not be applied as this scenario involves international roaming SMS traffic which is governed by the existing Permanent Reference Documents (“PRDs”) of the Billing, Accounting and Roaming Group (“BARG”) and the relevant charging principles of the International GSM Roaming Agreement between the mobile networks involved. If the Client Operator (acting in this case as HPMN) decides to charge SMSIP for this scenario of international roaming, because the Operator actually terminating the SMS traffic (VPMN) is charging the Client Operator (acting in this case as HPMN) for termination of the SMS traffic on its network, the SMSIP will revert such cost to the Elected Participating Operator from whose network the traffic has been originated.

Scenario 3: The SMS Hubbing Transit Charges as set out in the relevant annex of AA71 and the Elected Participating Operator’s Termination Charge set out in the relevant annex of AA71.

Scenario 4: The SMS Hubbing Transit Charges as set out in the relevant annex of AA71. The Elected Participating Operator’s Termination Charge (acting in this case as HPMN) set out in the relevant annex of AA71 should not be applied as this scenario involves international roaming SMS traffic which is governed by the existing Permanent Reference Documents (“PRDs”) of the Billing, Accounting and Roaming Group (“BARG”) and the relevant charging principles of the International GSM Roaming Agreement between the mobile networks involved. If the Elected Participating Operator (acting in this case as HPMN) decides to charge the SMSIP (directly or via a Third Party SMSIP) for this scenario of international roaming, because the Operator actually terminating the SMS traffic (VPMN) is charging the Elected Participating Operator for termination of the SMS traffic on its network, the SMSIP will
revert such cost to the Client Operator from whose network the traffic has been originated.

These traffic scenarios and charging principles apply to regardless of the fact that one or two SMSIPs are used to convey the message and regardless of the type of connection made between the Client Operator and the SMSIP (e.g. SS7 or SMPP)

This fact is illustrated as an example of applicable scenarios in the figures below:

![Operator 1 to Operator 2 Using 1 SMSIP SS7 SS7](image)

![Operator 1 to Operator 2 Using 1 SMSIP SS7 SMPP](image)

![Operator 1 to Operator 2 Using 1 SMSIP SMPP SMPP](image)
Fig 4 – Examples of applicable charges under scenario 1 (where the Client Operator is acting as Recipient Operator) or scenario 3 (where the Client Operator is acting as Originating Operator)
Operator 1 to Operator 2 Roaming on Operator 3 Using 1 SMSIP

SMSIP 1 will need to determine if Operator 2 is roaming on Operator 3; this will be determined by looking at the IMSI and vMSC address.

Operator 1 to Operator 2 Roaming on Operator 3 Using 2 SMSIPs

* If the destination operator has requested a roaming termination fee in the AA.71 and the fee will be passed to the originating operator.

Operator 1 to Operator 2 Roaming on Operator 3 Using 2 SMSIPs
9.2 Invoicing

9.2.1 General Principles

The SMSIP shall be responsible for payment of the charges raised by the Recipient Operator in accordance with its Termination Charges.

In accordance with the principles of cascade billing, the SMSIP shall charge the Originating Operator for the outgoing traffic successfully routed based on the SMSIP Transit Charges and the Termination Charges applied by the Recipient Operator.

The SMSIP shall charge the Originating Operator only upon receipt of a Successful Forward Response from the Recipient Operator. This will ensure that the Recipient Operator has accepted to terminate the message and will therefore avoid incorrect charges being sent to the Originating Operator.

If the Recipient Operator is unable to send the Successful Forward Response message due to technical limitations in the network (as opposed to message delivery failure), it shall be the SMSIP generating a Successful Forward Response message, if the Recipient Operator so requires.

The SMSIP shall then invoice the Originating Operator only upon the fact of confirmed Successful Routing of the SMS to the Recipient Operator's SMSC (System).

Please refer to the Annex 1 of the AA.71 for the exact definition of “Successful Routing”.

* If the destination operator has requested a roaming termination fee in the AA.71 and the fee will be passed to the originating operator.

Fig 5 – Examples of applicable charges under scenario 2 (where the Client Operator is acting as Recipient Operator) or scenario 4 (where the Client Operator is acting as Originating Operator)
The SMSIP shall offer the Client Operator a choice of invoicing mechanisms including:

A. The sending of one single invoice netting off the outbound and inbound traffic exchanged with the total of the Elected Participating Operators;

B. The sending of separate invoices per Elected Participating Operator, indicating the traffic exchanged with each partner.

C. The sending of one single invoice for the outbound traffic exchanged with all Elected Participating Operators. In this case, for the inbound traffic terminated in the Client Operator network, will be the Client Operator to raise an invoice to SMSIP.

In the above cases A. and B. the invoice sent to the Client Operator will separately show the invoice amounts due by the Client Operator for the outbound traffic terminated on the Elected Participating Operators’ networks and the amounts due to the Client Operator for the inbound traffic terminated on the Client Operator’s network.

In any case and independently from the invoicing method agreed, the SMSIP shall deliver to the Operator one report per month detailing:

- The amount of SMS traffic sent via the SMSIP to each Recipient Operator,
- The applicable rates per Recipient Operator ,
- The number of messages
- The total amount due.

The invoicing shall be based on the actual SMS MT BULK Data measured by the SMSIP (for outbound Traffic sent by the Client Operator) and by the Client Operator (for Inbound Traffic received by the Client Operator), during the elapsed month, unless otherwise agreed by the Parties..

All Charges shall be invoiced and paid effectively in the currency agreed between the Parties. Such Charges shall be payable on and from the Service Commencement Date or SMS Interworking Commencement Date, as applicable, and shall be payable only in respect of Chargeable Events.

The SMSIP shall notify the Client Operator, and by written notification, of any increase by any existing Participating Operator to its Participating Operator Termination Charges at least sixty (60) calendar days prior to the Invoice Period in which such revisions shall become effective.

The SMSIP may reduce all or any of the Participating Operator Termination Charges at any time upon written notice to the Client Operator. Moreover, a revised Annex 10 should be exchanged between the Parties via the SMSIP.

The Client Operator shall notify the SMSIP of any proposed increase to the Client Operator Termination Charges at least ninety (90) calendar days prior to the Invoicing Period in which such revisions shall become effective unless the Client Operator is required to revise the Client Operator Termination Charges by any
decision of any regulator or other competent authority within timescales which preclude the giving of such ninety (90) calendar days notice in which event the Client Operator shall give the SMSIP as much prior written notice of such revisions as is reasonably practicable in the circumstances.

The Client Operator may reduce the Client Operator Termination Charges at any time upon written notice to the SMSIP.

The SMSIP may increase the SMS Transit Charges on ninety (90) days' prior written notice per the beginning of an Invoice Period but shall not increase the SMS Transit Charges during the period of twelve (12) months following the Effective Date.

The SMSIP may reduce the SMS Transit Charges at any time upon written notice to the Client Operator. In the event of any increase in the SMS Transit Charges, the Client Operator shall have the right to terminate this Agreement upon at least eighty (80) days prior written notice to the SMSIP from the beginning of the Invoice Period for which the increased SMS Transit Charges would become effective.

The SMSIP shall within one calendar month of the end of each Invoice Period make available on a reporting website (the address of which will be notified by the SMSIP to the Client Operator) or through adequate reports, the details of the number of Successful SMS Delivery routed by the SMSIP in the Invoice Period to each Elected Participating Operator. Additional reporting details shall be provided from time to time by the SMSIP.

9.2.2 Bulk Data

The Client Operator shall receive a BULK Data per Elected Participating Operator from the SMSIP, which the Client Operator can, use to verify the information stated on the invoice.

The implementation of the BULK SMS Data transfer shall be in accordance with the relevant GSM Permanent Reference Documents with the exception of network specific deviations and/or chosen options agreed by the Client Operator and the SMSIP during the testing phase.

For each Invoice period (calendar month), the BULK SMS Data minimum content shall comprise:

- The name of the Recipient Operator to which the End User belongs
- The total number of messages sent by the Originating Operator delivered to each SMS hubbing destination
- The Termination Charges applied by the Recipient Operator
- The total amount to be invoiced, split by SMS hubbing destination
- The total amount to be invoiced.
- The Invoice period data that is applicable to.
10 OPERATION & MAINTENANCE

The SMSIP shall provide comprehensive and efficient Service Support on Fault Management procedures. Furthermore it is recommended that the SMSIP provides Service Management Support. The minimum features of Fault and Service Management services are described in the AA71 SLA.

10.1 Service Management

Service management support will be provided on Non-Faults situations to include, non-fault related operational problems, operation and maintenance routines and documentation, pricing and billing queries and technical information.

Such Service will be used for the following purposes:

- Traffic management,
- Participating Operators’ management,
- Product Update/ Upgrade management,
- Quality of Service reports,
- Maintenance Operations Management,
- Transit and/or Termination Charges information,
- Billing data management,
- Spamming/Fraud management,
- Project Management,
- Configuration management.

The aim is to provide this service on Monday – Friday, 0900 - 1700 excluding Public Holidays as a minimum, or with a different timing mutually agreed between the SMSIP and the Client Operator. If any of the issues mentioned above is considered critical under the reasonable opinion of the Client Operator and the Service management is support not available, the 24 x 7 x 365 contact indicated below should be used.

10.1.1 Traffic Management

Traffic Forecasts are to be included in Annex 15 to the AA71. The traffic forecasting provisions will be used for dimensioning the transit capabilities of the SMS Hubbing System and the SMS termination capabilities of the Client Operator’s system. They will not have any binding effect unless otherwise agreed between the SMSIP and the Client Operator in writing.
Client Operator Forecasts

Following an agreed timeline between the Client Operator and the SMSIP (e.g. every six months), the Client Operator shall provide to the SMSIP the annual outbound traffic forecast for SMS originated on its network, for conveyance by the SMSIP Hubbing Service and onward termination on all Elected Participating Operators' networks.

Revised versions of these figures, shall be provided by the Client Operator to the SMSIP in the timeframe agreed between the parties at the Agreement signature and if such revised data shows a change in the volumes higher than 20%, a proper notification and amendment in the capacity requirements shall be generated by the SMSIP.

SMSIP Forecasts

Following an agreed timeline between the Client Operator and the SMSIP (e.g. One month) after receiving the forecast from each Elected Participating Operator, the SMSIP shall provide the Client Operator with the annual inbound traffic information on the SMS originated by each Elected Participating Operator for conveyance by means of the SMSIP’s system and termination onto the Client Operator’s network.

Revised versions of these figures, shall be provided by the SMSIP to the Client Operator from time to time (e.g. on a quarterly basis), and if such forecasts show a change in the volumes higher than 20%, a proper notification and amendment in the capacity requirements shall be generated by the Client Operator.

Traffic report

The Traffic report will be used by the SMSIP and the Client Operator for forecast management and billing management.

The SMSIP will produce traffic statistics to the Client Operator in order to show:

- The total volume of SMS transmitted per quarter, per month, per Elected Participating Operator,
- The maximum number of SMS transmitted during the busiest hours,

The results will be monthly reported in the Traffic Report and sent to the Client Operator for analysis and for validation of the relevant invoice.

10.1.2 Participating Operators Management

Pursuant to the provisions for Election and Activation of the Participating Operators, the Client Operator may request the SMSIP from time to time to activate the SMS Interworking between the Client Operator and a new destination not included in the SMSIP’s list of Participating Operators.

In such cases, the SMSIP shall inform the Client Operator, within one month from his request, of the road map for implementation of the Interworking between the Client Operator and the required destination.
If feasible, the SMSIP shall offer this as a directly connected destination to his own SMS Hubbing Service, otherwise the SMSIP shall use a Third Party SMSIP to implement the required destination in the shortest possible time.

Every year (timing to be agreed upon between the SMSIP and the Client Operator within the contract), the SMSIP shall provide the Client Operator with its destination forecasts (i.e. an updated list of Participating Operators). Those forecasts shall be used by the SMSIP for implementing all necessary technical and charging parameters and by the Client Operator for systems configuration.

10.1.3 Product Updates/Upgrades Management

The SMSIP shall provide updated service packages with documentation, support tools and specifications. This is to cover pre-planned events (1-4 per year) and are for the purposes of delivering permanent solutions to any severe or major failures that require an action.

The SMSIP shall also provide upgrade packages with documentation, support tools and specifications. Such upgrades shall be no more than 1-2 per year and shall be planned in advance with the Client Operator.

If a new release does not work properly for any reason, then the SMSIP will have a proven rollback process in order to revert the system back to its original working state. In such a case, the time to restore the proper functionality of the service shall be taken into account when measuring the MTRS levels (see definition in Annex 13 of AA71 and Section 11 hereto).

Any SMSIP systems upgrade that may impact the availability and proper functionality of the SMS Hubbing Service shall be scheduled with the Client Operator and shall be performed during the Client Operator’s network off-peak hours and within the Scheduled Maintenance windows provided for in the Agreement signed between the SMSIP and the Client Operator.

The system updates shall be scheduled together with any upgrades (introduction of new functionalities), unless otherwise agreed between the SMSIP and the Client Operator.

Such update and upgrade packages shall also include solutions to problems detected in other countries and in operating systems where appropriate.

The SMSIP shall verify and test such solutions on an appropriate test plant and shall make the result of such tests available for inspection, auditing and testing by the Client Operator.

The SMSIP shall respect the Client Operator right to declare a “freeze” period during which no changes shall be made to the system by the SMSIP and any outage shall be deemed as critical (e.g. during Christmas, special events etc) and shall impact on the MTRS levels.
10.1.4 Quality of Service (QoS) Reports

The SMSIP shall provide the Client Operator with Monthly Performance Reports (MPR) on the QoS for traffic handled for the customer. These reports are delivered to the Client Operator to check the level of performance of the SMS Hubbing Service provided by the SMSIP. Such level of performance is measured through the KPIs as indicated in the SLA attached to the AA71 and in the section 11 hereto.

Monthly Performance Report (MPR)

The Monthly Performance Report (MPR) generated by the SMSIP shall record the traffic that is specifically generated by or to the Client Operator (on the bilateral Interworking relationship with any Elected Participating Operator). The report shall not include blended performance statistics of non-related traffic.

The MPR must include daily and hourly values for the KPIs defined in section 11 hereto. The values should be measured 24 x 7 x 365.

The SMSIP will store the SMS Hubbing Service MPR data for a minimum period of 6 months.

The SMSIP shall report on all destinations separately (i.e. per each Recipient Operator/Elected Participating Operator).

The MPR shall be received by the Client Operator no later than the Xth calendar day of each month. By definition, the MPR shall detail the performance of the previous month.

All MPR, without exception, shall be sent to the Client Operator’s contact points indicated by the Client Operator into the Agreement signed with the SMSIP –Annex 6 to AA71.

10.1.5 Maintenance Operations Management

Planned Outages

Where an outage is planned by the Client Operator or the SMSIP, the Party causing the outage is required to notify the other Party in advance with full details concerning that outage. A brief explanation of the operation shall be included and the impact or risk of impact, on the SMS Hubbing Service shall be always specified.

Periodical Maintenance tests

The SMSIP shall perform regular tests to check:

- The proper functionality of the Client Operator’s connection to the SMSIPs platform;
- The Interworking between the Client Operator and the Elected Participating Operators
For this purpose, the SMSIP shall use the testing features provided by the Client Operator. The SMSIP will only use them within the threshold limits agreed with the Client Operator at the Agreement signature and only for the sole purpose of performing the maintenance tests.

The SMSIP should always monitor the SMS traffic for each Elected Participating Operator and guarantee the QoS specified, (see section 11 hereto and Annex 13 to the AA71 for more details).

The testing features will be free from any activation fee or any subscription fee.

All costs occurring for tests made outside the Operator’s network under test will be charged by the issuing Operator to the SMSIP as if they were ordinary Chargeable Events. The SMSIP shall be fully responsible for these costs. Furthermore, the SMSIP is fully liable for all damages and costs incurred by misuse of the testing facilities pertaining to the Client Operator or any Participating Operator.

The parties agree to perform tests of service availability and functionality, according to the Test Specifications listed in the relevant IR PRD, every time one of the Parties indicates a major change that has an impact on the SMS Interworking between the Client Operator and the Elected Participating Operators.

10.1.6 Parameter Change Notification

The SMSIP and the Client Operator shall agree at signature of the Agreement on an ad hoc timing for notification of network and billing parameters change & contact points'update. Such information and relevant changes are to be exchanged via an update to the relevant Annexs of AA.71.

10.1.7 Billing Data Management

The SMSIP shall produce a monthly report including all “successfully routed” SMS per destination.

With consideration to the charging & billing provisions already set out in the Agreement signed between the Client Operator and the SMSIP, where necessary the SMSIP and the Client Operator shall use this monthly report to solve any billing dispute.

SMSIP to Client Operator

The SMSIP shall notify the Client Operator of any price changes proposed by the Elected Participating Operators. This will be done in accordance with the procedure and timescales set out in the Agreement (Art. 9 and Annexes 7 and 6 to the AA71), signed between the Client Operator and the SMSIP and / or in line with any other regulatory requirements.
Client Operator to SMSIP

The Client Operator shall notify the SMSIP of any proposed price changes. This will be done in accordance with the procedure and timescales set out in the Agreement (Art. 9 and Annexes 10 and 11 to AA71), signed between the Client Operator and the SMSIP and / or in line with any other regulatory requirements.

10.1.8 Spamming/Fraud Management

Spamming/Fraud Management is left for further study within IREG & FF.

10.1.9 Project Management

Connection between SMSIP System and the Client Operator’s System

The SMSIP shall designate an Account Manager to be responsible for the operational management of the SMS Hubbing Service from date of signature of the Agreement until six calendar months after the Effective Date.

The Account Manager shall co-ordinate all technical and implementation operations with the Client Operator and shall report weekly to the Client Operator on the project progress, unless otherwise agreed between the Client Operator and the SMSIP.

Operating period

The SMSIP shall designate an Account Manager to manage all technical and rollout operations required when a new destination (new Elected Participating Operator) has to be activated.

Activation is considered to take place from the moment the Client Operator requests to implement the SMS Interworking with that Elected Participating Operator and until 1 month after the relevant SMS Interworking Commencement Date.

10.1.10 Configuration Management

The goal of this Customer Care Service is to optimise the permanent relationship between the SMSIP and the Client Operator.
Hence the SMSIP may offer a service composed of Push mail\(^1\) - by sending an e-mail to the relevant Client Operator contacts, the SMSIP will notify any new version of the data relevant to the SMS Hubbing Service offered to the Client Operator.

Such data will be stored in an E-Library to which the Client Operator can have access through a web page on the SMSIPs extranet.

Example of Data stored in the E-library:

<table>
<thead>
<tr>
<th>Customer Care</th>
<th>Library Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic management:</td>
<td>SMSIP Traffic Forecast</td>
</tr>
<tr>
<td></td>
<td>Client Operator forecast</td>
</tr>
<tr>
<td></td>
<td>Delivered traffic Reports</td>
</tr>
<tr>
<td>Participating Operators</td>
<td>PO list</td>
</tr>
<tr>
<td>management:</td>
<td>POs Contact information</td>
</tr>
<tr>
<td></td>
<td>Elected P O list</td>
</tr>
<tr>
<td></td>
<td>Technical parameters</td>
</tr>
<tr>
<td></td>
<td>IR.21 of each PO</td>
</tr>
<tr>
<td>Product Update/</td>
<td>Tools and specifications</td>
</tr>
<tr>
<td>Upgrade management:</td>
<td>Specifications and roadmap for Service development</td>
</tr>
<tr>
<td></td>
<td>Specifications for solution to any severe or major failures</td>
</tr>
<tr>
<td>Quality of Service reports</td>
<td>All MPRs</td>
</tr>
<tr>
<td>Maintenance Operations</td>
<td>Planned Outages program</td>
</tr>
<tr>
<td>Management</td>
<td>Planned “operational feedback” program</td>
</tr>
<tr>
<td>Transit and/ or Termination</td>
<td>Updated Transit and termination charges of PO</td>
</tr>
<tr>
<td>Charges</td>
<td></td>
</tr>
<tr>
<td>Billing management</td>
<td>Bulk Data Statistics</td>
</tr>
<tr>
<td></td>
<td>Billing statistic based on KPIs reports</td>
</tr>
<tr>
<td>Spamming/Fraud Management</td>
<td>TO BE COMPLETED</td>
</tr>
<tr>
<td>Project Management</td>
<td>Updated Project Management Plan</td>
</tr>
<tr>
<td>Fault Management</td>
<td>Fault/Trouble reports</td>
</tr>
<tr>
<td></td>
<td>Statistic faults report</td>
</tr>
</tbody>
</table>

10.2 Fault Management

\(^1\) In no way, this service may send commercial emails to Client Operator without its prior consent, and/or means emails including but not limited to Spam, advertising and promotional Short Message which the recipient has not given his/her express prior consent to receive
10.2.1 Central Entity Contact Point

The SMSIP and the Client Operator must name a central entity (single point of contact) that is reachable 24 hours a day, 365 days a year and responsible for official notification processes in case of SMS Hubbing Service faults.

The requirements for the central notification contact are:

- Contact must be available 24 hours a day at a single telephone contact number
- Competency concerning operational issues for SMS services
- Remote access to decentralized operational network elements
- Relevant access to tools, resources and knowledgebase to solve problems

10.2.2 Fault Management Service and Definitions

The Fault Management service shall be provided by the SMSIP on “Fault situations” (i.e. when there is an event affecting the SMS Hubbing Service’s functionality) and shall include:

- Proactive fault detection
- Fault resolution
- Trouble Report Handling

The SMSIP must be able to proactively detect any fault within the SMSIP System and at the interface between the SMSIP System and any Participating Operator’s System.

The SMSIP shall open a trouble ticket in the case of any fault on the SMS Hubbing Service reported by the Client Operator (at the contact points indicated in the Matrix below) or any fault detected by the SMSIP’s proactive detection capabilities.

A severity level shall be assigned to each trouble ticket to describe the effect of the fault on the SMS Hubbing Service.

The following three levels of severity will be used for trouble tickets:

**Critical**

Total interruption or serious degradation of the performance of the Service as measured by the KPIs indicated in the Agreement SLA, with relevant number of Client Operator’s end-users affected. Includes but it is not limited to:
- Total loss of connectivity between the Client Operator and SMSIP platform.
- Loss of connectivity between the SMSIP and the connected Third Party SMSIP
- Serious degradation of the QoS (e.g. Total loss of the SMS traffic to one or several Elected Participating Operators).
Major

Loss of redundancy of the routes connecting the Client operator and the SMSIP without isolation of the network. Degradation of the quality of the SMS Hubbing Service as measured by the KPIs indicated within the Agreement SLA as reported through the measurements performed by both the Client Operator and the SMSIP. Includes but it is not limited to:
- Partial Loss of the SMS traffic
- Degradation of the QoS to any Elected Participating Operator.

Minor

Minor fault categories include but not limited to:
- Failure of redundant systems (currently not service affecting)
- Failure affecting isolated or individual MSISDN numbers.

The fault may at any time, during a particular fault outage, change its status from or to Critical/Major/Minor, by agreed notification of either Party to the other.

Maximum times for restoration of the service (MTRS) and status update intervals shall be negotiated between the Parties.

Table 3 Maximum restoration times and status update intervals

<table>
<thead>
<tr>
<th>Severity</th>
<th>Maximum restoration times</th>
<th>Initial Feedback</th>
<th>Update Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>X hours</td>
<td>X minutes</td>
<td>X hour</td>
</tr>
<tr>
<td>Major</td>
<td>X hours</td>
<td>X min</td>
<td>X Hours</td>
</tr>
<tr>
<td>Minor</td>
<td>X working days</td>
<td>X minutes</td>
<td>X working day</td>
</tr>
</tbody>
</table>

The SMSIP support for fault reporting should be available 24x7x365.

10.2.3 Fault Reporting by the Client Operator

Suspected faults on the SMS Hubbing Service shall be reported to SMSIP by e-mail to the contact indicated in the relevant matrix included AA71.

For critical faults, it will be also followed by a phone call to the same contact.

Faults will be logged and each SMS will be time-stamped and allocated a unique reference number in the SMSIP trouble ticket system to be used for all progress updates.

The SMSIP shall provide also its internal reference number for tracking.
To diagnose and resolve suspected faults, the SMSIP will require specific information when the problem is first reported. This will normally include:

- Company name
- Name, telephone number and email of the person reporting the fault
- Client Operator's contact name, telephone number and email, if different from the above
- Client Operator’s Fault Trouble Ticket Number
- Physical location of the fault
- GSR reference
- Details (SMSIP services at site, symptoms, any tests carried out in attempting to isolate the problem) of the fault
- Any environmental conditions, such as a power failure, that may be causing the fault
- Severity (Critical/Major/Minor)
- SMS traces may be included, where available.

10.2.4 Fault Reporting by the SMSIP

The SMSIP shall inform the Client Operator immediately after it becomes aware of any fault in the SMSIP System, with any system run by any Third Party SMSIP or with any Participating Operator System or other system involved in the traffic delivery.

The SMSIP shall inform using the contact points given in the relevant matrix within the Agreement signed with the Client Operator (Annex 6 to AA71) and send a written notification to the same contact points.

In any case, the SMSIP shall inform the Client Operator within 30 minutes of being aware of such a fault.

Such written notification reporting the problem to the Client Operator shall include:

- Company name
- Name, telephone number and email of the person reporting the fault
- Client Operator contact name, telephone number and email, if different from the above
- Fault Trouble Ticket Number
- Physical location of the fault
- GSR reference
- Details (SMSIP services at site, symptoms, any tests carried out in attempting to isolate the problem) of the fault
Any environmental conditions, such as a power failure, that may be causing the fault

Severity (Critical/Major/Minor)

SMS traces may be included, where available

The SMSIP must agree to work towards the implementation of an electronic notice board solution for the delivery of such fault notifications.

Following the issue of any such notice in respect of a fault, the SMSIP shall keep the Client Operator informed of the progress of remedial works according to the time intervals agreed in the Agreement signed with the Client Operator.

10.2.5 Fault Resolution

The SMSIP shall resolve faults within the time interval described in the relevant section of AA71 SLA and illustrated in table 3.

The time interval shall start from the moment when the trouble ticket is opened (i.e. from the moment when the fault is reported to the SMSIP by the Client Operator or the SMSIP becomes aware of the fault and immediately starts proper fault handling intervention actions and informs the Client Operator accordingly, in line with the procedure stated within the above paragraph “Fault reporting by the SMSIP”), until it is closed due to resolution of the fault.

The SMSIP shall provide the Client Operator with the agreed progress updates as reported in table 3.

In accordance to such agreed progress updates, an e-mail (accompanied with a phone call, optionally whenever it is considered necessary and mandatory because it is a critical fault) shall be sent with the following information as a minimum:

- Liability (SMSIP, Third Party SMSIP, destination,..)
- Resolution date/time
- Cause information
- Actions done
- Further information
- Result of end-to-end measurement if applicable

If the SMSIP cannot resolve a fault within the timeline, agreed with the Client Operator in the Agreement SLA or at the moment when the trouble ticket is opened, the SMSIP shall, via an escalation procedure, use reasonable endeavours to achieve its resolution. In such cases anyway, the time to restore the proper functionality of the SMS Hubbing Service shall be taken into account when measuring the monthly MTRS level.

After this initial information updates following "Table 3: Target restoration times and status update intervals" are agreed on. On any request the central notification addresses are able to give information on the status of the trouble/problem.
Only the central notification addresses can issue an official fault clearance (closure of trouble ticket for fault resolution).

The Client Operator shall double check if the trouble is definitively solved and accepts or rejects the fault clearance. Faults will be classified as «cleared» and the «Response and Restoration Time Clock» stopped. Faults are not to be closed on either end without agreement from both Parties’ fault reporting contact points.

The duration of the fault is calculated as the time difference between the time of the notification of the fault to the agreed responsible point of contact of either Party (i.e. the fault reporting contact point), and the time of the notification of the fault solution to either Party. If an examination shows that the fault still exists then the fault solution notification is returned to the agreed contact points and the fault duration continues to run. The times registered on the fault reference will be used.

Both Parties must name contact persons as single point of contact for escalation. The escalation procedure can be delayed at the discretion of the fault reporting contact points for a mutually agreed period where the fault has been identified and is being addressed by engineering staff of either Party.

Both parties are to comply with internal procedures for the escalation of faults. However, the reporting Party may (at any time) request that a fault is escalated in advance of the times set out above. This is done if in the reasonable opinion of that Party, an escalation is required to increase the resources dedicated to a fault.

The receiving Party may escalate a fault in advance of the times set out below if it requires further information to progress the fault and that information has not been provided within a reasonable time scale.

In some cases certain faults do not need to be escalated automatically. A case can occur where the investigation of a fault is in progress and any escalation out of hours would serve no practical purpose. Both parties are to use reasonable judgment regarding the benefit of escalating a particular fault.

All escalation between the Client Operator and the SMSIP must be accomplished using the following steps through the headquarters of the Parties.

<table>
<thead>
<tr>
<th>Escalation Level</th>
<th>SMSIP</th>
<th>Client Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>&lt;Contact Details&gt;</td>
<td>&lt;Contact Details&gt;</td>
</tr>
<tr>
<td>Level II</td>
<td>&lt;Contact Details&gt;</td>
<td>&lt;Contact Details&gt;</td>
</tr>
<tr>
<td>Level III</td>
<td>&lt;Contact Details&gt;</td>
<td>&lt;Contact Details&gt;</td>
</tr>
</tbody>
</table>

*Table 4: Escalation Contact Points*

Note: Non-service affecting faults will not be escalated outside of normal working hours.
Table 5: Escalation Times

In all cases, if the fault is not resolved within the timeframe agreed between the Parties when a trouble ticket is opened and there is a degradation of the service quality level provided by the SMSIP to below the contractually agreed targets as measured by the KPIs indicated within the Agreement SLA (Annex 13 to AA71), the Client Operator is entitled to:

- Request the SMSIP, in the case where the fault is affecting the network/service offered by a connected Third Party SMSIP, to immediately re-route the traffic to other prioritized and tested routes (other Third Party SMSIPs).
- Re-route the traffic to other routes or third Party SMSIP

With respect to all cases where a connected Third Party SMSIP intervenes on the traffic delivery and there is a fault originated on the connected Third Party SMSIP’s network, should the SMSIP not be able to solve the fault within the time agreed with the Client Operator at the moment when the trouble ticket is opened, or is conscious that the fault will cause a service degrade to the Client Operator, the SMSIP shall proactively inform the Client Operator and change its routing based on own analysis to meet the Client Operator’s demands.

In all cases, the time to restore the proper functionality of the SMS Hubbing Service shall be taken into account when measuring the monthly MTRS level.

10.2.6 Communications

The SMSIP will undertake to communicate the following events within the timescales below:

- Planned Outages (including product upgrades/updates): minimum XX days of prior written notice
- Communication of Suspension of SMS Hubbing Service: maximum XX days of prior written notice.
- Emergency situations will be expedited of prior written notice.

So depending on the type of communication, the contact persons on the SMSIP and the Client Operator’s side will vary. Relevant information on the contact points will be exchanged at the signature of the Agreement.

Reduced periods of notice will only be accepted as an exception. The number of reduced periods of notice will be closely monitored by each operator and subject to review at regular SMS Hubbing Service review meetings.
Where an event is planned, each Party is required to notify the other in advance of full details concerning that event. A brief explanation of the operation shall be included and the impact or risk of impact, in the SMS Hubbing Service shall be always specified.

10.2.7 Planned Outages, Product Updates/Upgrades

Before planned work is undertaken that might affect the SMS Hubbing Service, each Party will give a notice to the other Party in line with the timescales stated in 10.2.4 above; if such timescales are not respected, the work will be considered as an unplanned outage, that is, a fault.

This work could be:

- Configuration changes (physically, logically)
- Changes of expected traffic (amount, quality)
- Hardware changes
- Software changes (software updates / software upgrades)
- Maintenance works in the transmission network

It is recommended that the agreed schedule for all planned works fits with low peak times according to the Client Operator, e.g. between 02:00 and 06:00 local time, on working days from Monday to Thursday.

In all cases described above, each Party's network management organization will take action to reduce disruption of traffic flows to the minimum.

For all works affecting the Client Operator's traffic, it is also essential to have in advance a contact available during the planned work who can be contacted to know the status of the work.

Both Parties reserve their right to refuse a scheduled event when an important reason exists. A scheduled event is only approved and can be carried out if both Parties agree on the event.

Advice of proposed planned work will be provided by e-mail, the receiving Party must acknowledge receipt of the advice by a return e-mail within one (1) working day. If the receiving Party does not acknowledge the receipt, the originating Party will call the contact number of the receiving Party and ask for a “GO” or “NO GO” decision. The originator must not proceed with the work without concurrence of the receiving Party, that cannot be unreasonably withheld, otherwise the work will be considered as an unplanned work/outage, that is a fault.

If a new release does not work properly for any reason, then the SMSIP will have a proven rollback process in order to revert the system back to it's original working state. In such a case, the time to restore the proper functionality of the SMS Hubbing Service shall be taken into account when measuring the MTRS levels.
The SMSIP will respect the Client Operator’s right to declare a freeze period such that no changes shall be made to the system by the SMSIP and any outage is critical (e.g. during Christmas, special events etc).

10.2.8 Fault Reports/Planned “operational feedback”
Within 10 calendar days of the beginning of each month, a report shall be issued by the SMSIP including the faults and troubles encountered in the previous month for a common Client Operator’s and SMSIP’s review and analysis to find a permanent solution and/or to provide update packages.

10.2.9 Communication of Suspension (as per the AA71 definition) of SMS Hubbing Services:
A minimum of 30 days prior written notice to the Client Operator is required. Emergency situations will be expedited.

Depending on the type of communication, the contact person on the SMSIP and the Client Operator will vary. Contact points shall be included in the Agreement (Annex 6 to AA71).
11 SERVICE LEVEL AGREEMENT (SLA)

11.1 Introduction

The purpose of the SLA (Annex 13 to AA71) to be attached to the Agreement signed between the Client Operator and the SMSIP is to set the level of performance and the QoS that the Client Operator has the right to receive from the SMSIP on the end-to-end SMS Hubbing Service.

One of the basic requirements for the SMS Hubbing Service is end-to-end quality to be intended as QoS to be provided from the traffic origination point (the Originating Operator’s network) to the traffic termination point (the Recipient Operator’s network). When an end-customer registered on the Client Operator’s or the Elected Participating Operator’s network, sends an SMS, such SMS shall have to reach the recipient in a timely manner. This obliges the SMSIP to ensure that end-to-end quality is guaranteed to the Client Operator.

In order to set the minimum level of end-to-end QoS on the SMS Hubbing Service, a set of performance targets has to be agreed between the SMSIP and the Client Operator.

The first step for a Client Operator to negotiate an SLA with the SMSIP is to define the Key Performance Indicators (KPI) to be included in the SLA attached to the Agreement, with the relevant thresholds/target values to be achieved by the SMSIP. The level of performance/QoS reached by the SMS Hubbing Service to the Client Operator shall be measured and monitored through the SLA’s KPIs.

Reference KPIs and associated thresholds/target values to which the SMSIP has to commit are included in section 11.2 and 11.3 hereto.

In order to properly and regularly monitor the SMSIP QoS performance, the Client Operator shall receive monthly QoS reports (as per section 11 hereto) including the outcome of the measurements performed by the SMSIP during the previous month.

If the SMSIP fails to achieve the committed levels of performance/QoS indicated in the SLA attached to the Agreement, the Client Operator shall be entitled to ask the SMSIP for a Service Credit. Such Service Credit shall automatically be applied by the SMSIP within the invoice of the relevant invoicing month, without the need of an adhoc request made by the Client Operator.

The most important KPIs that shall be included in the SLA are the “Availability of the Service” and the “MTRS - Maximum Time to Restore the Service”; it is however strongly recommended to include in the SLA all the KPIs stated in the paragraph below.

11.2 SMS Hubbing Key Performance Indicators

Due to the different possibilities of the signalling protocols used between the Client Operator’s SMS platform and SMSIP’s SMS Hubbing platform and between the SMSIP’s SMS Hubbing platform and the Elected Participating Operators’ SMS Platform, it has been necessary to define:
• A set of general KPI’s (not depending of the protocols used)
• Two options depending on the protocol used between the Client Operator’s SMS platform and the SMSIP’s SMS Hubbing Platform (SS7 or SMPP).

**General KPIs:**

**SMSIP System Availability** - describes the percentage of time that the SMSIP System is carrying its function out properly.

**SMS Hubbing Service Availability** - describes the percentage of time that the SMS Transit Service is carrying its function out properly.

**SMS Hubbing Service Availability Per Destination** - describes the percentage of time that the SMS Transit Service is carrying its function out properly for a certain destination i.e. the Client Operator or an Elected Participating Operator.

**Maximum Time to Restore the Service** – for service errors or faults

**Service Provisioning Timeframes** - defines the average timeframes for an SMSIP to perform and undertake certain activities in respect of provisioning/commissioning.

**Option 1.** SS7 protocol used between the Client Operator’s SMS platform and SMSIP’s SMS Hubbing Platform.

The following KPIs measure the transit failure ratios and the transit times for the different SS7 messages involved in the delivery of an SMS when the destination uses also an SS7 based SMS platform:

- SRI Message Transit Failure Ratio.
- SRI Message Transit Time.
- SRI Message Failure Ratio.
- SRI Message Process Time.
- SRI Acknowledgement Transit Failure Ratio
- SRI Acknowledgement Transit Time
- SMS Message Transit Failure Ratio
- SMS Message Transit Time
- SMS Message Failure Ratio
- SMS Message Process Time
- SMS Acknowledgement Transit Failure Ratio
- SMS Acknowledgement Transit Time
- SMS Overall Transmission Time
The following KPIs measure the transit failure ratios and the transit time for the different SS7 MAP messages involved in the delivery of an SMS when the destination uses a SMPP based SMS platform:

- SMS Message Transit Failure Ratio
- SMS Message Transit Time
- SMS Acknowledgement Transit Failure Ratio
- SMS Acknowledgement Transit Time
- SMS Message Failure Ratio
- SMS Message Process Time

**Option 2.** SMPP protocol used between the Client Operator’s SMS platform and SMSIP’s SMS Hubbing Platform.

The following KPIs measure the transit failure ratios and the transit times for the different SMPP messages involved in the delivery of an SMS when the destination uses also an SMPP based SMS platform:

- SM Message Transit Failure Ratio
- SM Message Transit Time
- SM Response Transit Failure Ratio
- SM Response Transit Time
- SM Message Failure Ratio
- SM Message Process Time

The following KPIs measure the transit failure ratios and the transit times for the different SMPP messages involved in the delivery of an SMS when the destination uses an SS7 based SMS platform:

- SM Message Transit Failure Ratio
- SM Message Transit Time
- SM Response Transit Failure Ratio
- SM Response Transit Time
- SM Message Failure Ratio
- SM Message Process Time
Practical Information to the Negotiation of SLA

It is the SMSIPs responsibility to ensure that the level of quality provided to the Client Operator does not get lower when a Third Party SMSIP is involved in the traffic delivery.

The Client Operator has the right to have visibility on the routing used to terminate the SMS towards all the destinations/Participating Operators offered by the SMSIP. In this sense the SMSIP should include in its commercial proposal the details of the routing used for SMS traffic exchange with all the destinations connected via a Third Party SMSIP.

If an infrastructure not pertaining nor managed by the SMSIP is used to connect to the SMSIP’s platform, the target QoS values committed by the SMSIP in the SLA shall not be affected.

11.3 Key Performance Measurement Figures

The average target QoS values to be agreed with the SMSIP based on the KPIs indicated above are as follows:

<table>
<thead>
<tr>
<th>GENERAL KPIs</th>
<th>KPI measured</th>
<th>Average reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SMSIP System Availability [%]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Transit Service Availability [%]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Transit Service Availability [%]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum Time to Restore the Service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Service Provisioning Timeframes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 1. SS7 Origin SMS Platform</th>
<th>KPI measured</th>
<th>Average reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For SS7 destination SMS platform</td>
<td>SRI Message Transit Failure Ratio.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SRI Message Transit Time.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SRI Message Failure Ratio.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SRI Message Process Time.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SRI Acknowledgement Transit Failure Ratio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SRI Acknowledgement Transit Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Message Transit Failure Ratio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Message Transit Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Message Failure Ratio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Message Process Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Acknowledgement Transit Failure Ratio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Acknowledgement Transit Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMS Overall Transmission Time</td>
<td></td>
</tr>
</tbody>
</table>

For SMPP destination SMS platform
### KPI measured

<table>
<thead>
<tr>
<th>KPI measured</th>
<th>Average reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS Message Transit Failure Ratio</td>
<td></td>
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<tr>
<td>SMS Message Transit Time</td>
<td></td>
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<tr>
<td>SMS Acknowledgement Transit Failure Ratio</td>
<td></td>
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<tr>
<td>SMS Acknowledgement Transit Time</td>
<td></td>
</tr>
<tr>
<td>SMS Message Failure Ratio</td>
<td></td>
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<tr>
<td>SMS Message Process Time</td>
<td></td>
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</tbody>
</table>

### OPTION 2. SMPP Origin SMS Platform

**For SMPP destination SMS platform**

<table>
<thead>
<tr>
<th>KPI measured</th>
<th>Average reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM Message Transit Failure</td>
<td></td>
</tr>
<tr>
<td>SM Message Transit Time</td>
<td></td>
</tr>
<tr>
<td>SM Response Transit Failure</td>
<td></td>
</tr>
<tr>
<td>SM Response Transit Time</td>
<td></td>
</tr>
<tr>
<td>SM Message Failure Ratio</td>
<td></td>
</tr>
<tr>
<td>SM Message Process Time</td>
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</table>

**For SS7 destination SMS platform**

<table>
<thead>
<tr>
<th>KPI measured</th>
<th>Average reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM Message Transit Failure Ratio</td>
<td></td>
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<tr>
<td>SM Message Transit Time</td>
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<tr>
<td>SM Response Transit Failure Ratio</td>
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<tr>
<td>SM Response Transit Time</td>
<td></td>
</tr>
<tr>
<td>SM Message Failure Ratio</td>
<td></td>
</tr>
<tr>
<td>SM Message Process Time</td>
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</tbody>
</table>

Additionally the reference value for the KPI referred above as MTRS is included in the section 11 hereto, table 3 above.
12 SECURITY

The SMSIP shall be responsible to ensure the security of the SMS Hubbing Services as set out below:

- Filtering of Spamming (particularly of faking and spoofing)
- Filtering of the offensive SMS (example: virus)
- Filtering of SMS with incorrect format (“syntactic” filtering)
- Ensuring that only SMS sent by the Elected Participating Operators can be received by the Client Operator
- Stopping all the SMS sent by an identified Elected Participating Operator within the following X hours (to be defined), on notification of the Client Operator
- Replying to the Client Operator’s audits on the access to its SMSC
- Replying to the Client Operator’s inquiries, in particular on the architecture of the SMS Hubbing Service and on the integrity of the mechanism agreed by the SMSIP and the Client Operator for the election and activation of the SMS Interworking Partners
- Ensuring the confidentiality of the SMS’ content
- Providing information on the “SMS Spam” (date, hour, origin address) in the event of reception of a SMS not requested (to be defined in the Agreement, for example in the event of Spamming)
- Where possible: controlling the content of the SMS and blocking those with illicit content.
13 MOBILE NUMBER PORTABILITY HANDLING

This section will be completed upon the solution elaborated by the SMSHTI Group and approved by the Open Connectivity SPT.
14 PROCEDURES FOR MIGRATION OF SMS TRAFFIC FROM BILATERAL SOLUTION TO HUBBING SOLUTION

Currently most Operators, namely GSM Operators, having SMS Interworking relationship, have established them, through a bilateral solution, in which both Operators have a direct relationship for network use, charging and billing.

The bilateral way to open an international SMS Interworking relationship between two different mobile operators today follows a standard procedure.

This procedure refers to the exchange a specific Annex to the IRA (International Roaming Agreement) called AA19, that rules the interworking for SMS traffic exchange (test procedures, termination fees, etc).

Once that the SMS Interworking agreement is clinched between the two mobile operators using the AA19, the parties, through a regular update of the respective IR21 document, ensure that the respective network relevant information are properly configured and updated on either Party’s network. This procedure enables the termination of SMS traffic on the parties’ respective networks, while the clearing and invoicing activities and the billing settlement in case of any dispute are managed directly by the involved mobile operators.

The SMS Hubbing approach completely change this procedure.

It is noted that an Operator may run in parallel some SMS Interworking relationships through the bilateral model and some others through the SMS Hubbing Service. At any moment in time the Operator may choose to migrate an SMS interworking relation from a bilateral to a hubbing approach or vice versa.

It's also noted that this migration to the SMS Hubbing Service may occur only for the Operator’s outgoing SMS traffic or for the Operator’s incoming SMS traffic or for both. Notwithstanding this option, it is expected and suggested that the Operators have both flows of traffic in an SMS Interworking relationship ruled via the same solution (bilateral or SMS Hubbing).

In any case, the Operator willing to perform the migration of the SMS Interworking relationships from a bilateral to an SMS Hubbing solution has to:

- Define a migration plan with its SMSIP indicating the list of partners (Participating Operators) that he wants to migrate from the bilateral to the SMS hubbing solution.

- Share this migration plan with the impacted Operators that are already linked through the bilateral SMS Interworking relationship, providing an indication on the timeline foreseen for the migration.

- Configure the technical information of the own SMSIP in the own network.

- Start the migration in accordance to the process agreed with the SMSIP and with the elected Participating Operators, former partners of the bilateral SMS Intworking relationship.
The described procedure will be valid for both ON-NET Participating Operators of a specific SMSIP as for its OFF-NET Participating Operators (i.e. Operators connected via a Third party SMSIP).

Following this procedure, the Client Operator at the migration date agreed with the SMSIP, is entitled to not allow any longer the exchange of SMS traffic with the migrated SMS Interworking Partners via the bilateral relationship, but will only allow the routing of SMS traffic via the SMSIP.

At an early stage of development and implementation of the SMS Hubbing Service in the market, it may occur a situation where the SMS Interworking Partners linked by a bilateral relationship may not agree on the migration to an SMS Hubbing Service or may not agree on the timeline for such migration. In this case in order for the two SMS Interworking Partners not to interrupt the exchange of SMS traffic it is crucial that the SMS Interworking Partners coordinate their actions, directly or via the SMSIP before any migration takes place.
15 OTHER REFERENCES

BA.27 Charging and Billing Principles
AA.19 SMS Interworking Agreement (for bilateral use)
AA.71 Agreement for International SMS Interworking Services (including SLA)
IR.70 SMS SS7 Fraud
IR.71 SMS SS7 Fraud Prevention
AA.50 SMS Fraud Criteria
3GPP TS 03.40 – Technical realization of the Short Message Service (SMS) Point-to-Point (PP)
3GPP TS 29.002 – MAP specifications
3GPP TS 123.066 – SS7 MNP
OC SMS Hubbing Architecture – SMSHTI Gen doc 004 rev 6
OC High Level Requirements – OC 6_004 rev 5
SMPP version 3.4 and 5.0 specifications.
A FAQ section can be found on the GSM Infocentre / OC page in order to help answer operator concerns about SMS Hubbing implementation