BABT 680

Guide to the TÜV SÜD BABT Implementation of the 2008 Ofcom Metering and Billing Scheme

TÜV SÜD BABT is the Telecommunications Certification body of TÜV SÜD

Issue 4

Foreword

This guide explains the TÜV SÜD BABT Metering and Billing Certification and Approval Scheme as applicable to the 2008 Ofcom Metering and Billing Direction. Certification is open to any Communications Provider or associated company (generally referred to as an Applicant - see section 2.1), whether located in the UK or elsewhere.

This scheme describes how Applicants can apply for and maintain a Certificate of Compliance with the Technical Requirements of the 2008 Ofcom Metering and Billing Scheme.

This scheme also describes how CPs in the UK who are subject to and must comply with General Condition 11 of the Notification under Section 48(1) of the Communications Act 2003 can apply for, obtain and maintain Regulatory Approval once they have obtained certification.

This guide should be read in conjunction with the following documents:

- The United Kingdom Communications Act 2003
- Notification of a modification under Section 48 (1) of the UK Communications Act 2003, Modification to General Condition 11 on Metering and Billing, dated 15 July 2008
- The Ofcom Metering and Billing Direction (15 July 2008), ("Direction")
- Certification Regulations
- ISO9001: 2008 Quality management system - Requirements

The formal requirements of the scheme are set out in the Certification Regulations. Sections A, B2, and C3 of these Regulations apply to applications for and holders of TÜV SÜD BABT TMBS certificates

In this document, unless the context requires otherwise, "you" and "your" means the Applicant applying for approval of a TMBS and "we", "us" and "our" refers to TÜV SÜD BABT.

All TÜV SÜD BABT publications are available from:

http://www.babt.com (See the download area under *Information Resources*)

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List of Abbreviations

BAPM	Billing Accuracy Programme Manager	Defined in section 2.3
BS	British Standard	
CDR	Call Data Record	
CP	Communications Provider	e.g. Network Operator, Service Provider, Reseller
EN	European Norm	i.e. European Standard
EPF	Extraordinary Performance Failure	Defined in section 8.8.10
GC	General Condition	One of a series of requirements imposed by Ofcom on CPs in the United Kingdom as a condition of providing PECS
HLD	High Level Description document	Defined in section 8.4
ISO	International Standards Organisation	
ITU	International Telecommunication Union	
MVNO	Mobile Virtual Network Operator	
OBAPM	Ofcom Billing Accuracy Programme Manager	Defined in section 2.3
Ofcom	Office of Communications	The National Regulatory Authority for communications in the UK
PATS	Publicly Available Telephone Service	Defined in the UK Communications Act 2003
PECS	Public Electronic Communications Services	Defined in the UK Communications Act 2003
PMS	Process Management System	Defined in section 8.9.1
QMS	Quality Management System	
SS7	ITU Signalling System 7	Also known as C7
TMBS	Total Metering and Billing System	Defined in section 8.2
VoIP	Voice over Internet Protocol	
WLR	Wholesale Line Rental	

1 INTRODUCTION

1.1 Scope

This document covers:

- Certification – Certification to the Technical Requirements of the Ofcom Metering and Billing Scheme 2008[1].
- Approval – Metering and Billing Approval to comply with General Condition 11 (GC11) of the Notification under Section 48(1) of the UK Communications Act 2003 (the Act)[2].

1.2 Definitions

It is necessary for clarity to distinguish between the various organisations associated with Metering and Billing activities. They are:

Communications Provider (or CP): The organisation providing public electronic communications services. Unless otherwise stated, the CP's clients are retail customers (or end-users) who either receive a bill for communications services (post-pay) or pay for them in advance (pre-pay).

Supplier: The organisation supplying services to a CP that might affect the latter's billing accuracy.

Applicant: Either a CP or a Supplier seeking Certification from TÜV SÜD BABT. An Applicant can be a person or a body corporate.

Organisation: This is a general term covering all CPs and Suppliers, not just those seeking Certification from TÜV SÜD BABT.

1.3 Overview

Certification is open to any Applicant (see section 2.1), whether located in the UK or elsewhere. Approval is limited to those UK CPs required by the Direction to seek it. However, the TÜV SÜD BABT scheme is designed so that Approval can be given to any UK CP holding a Metering and Billing Certificate upon achieving the relevant threshold specified in GC11.

As a prerequisite to the issue of a TÜV SÜD BABT Metering and Billing Certificate or Approval you are required to agree to conform to the Certification Regulations[3] as relevant to Metering and Billing Certification and Approval.

This implementation requires comprehensive initial and ongoing assessment of the Applicant's Total Metering and Billing System (TMBS) against the Direction, together with regular measurement of the TMBS accuracy. Detailed guidance on preparing for, and maintaining, Certification and Approval is contained within section 8.

When TÜV SÜD BABT is satisfied that the Applicant's TMBS is compliant with the Direction, it will issue a Certificate to that effect. This will list the Public Electronic Communications Services (PECS) provided by the Applicant using the compliant TMBS.

Where Approval is also sought, this will be issued once Certification has been obtained and following a period of notification. The details will also be published on the TÜV SÜD BABT web site, http://www.babt.com.

[1] The Ofcom Metering and Billing Scheme 2008 – http://www.ofcom.org.uk/consult/condocs/metering_billing/metering.pdf
[2] Notification under Section 48(1) of the UK Communications Act 2003 - http://www.ofcom.org.uk/consult/condocs/metering_billing/mbstatement
[3] TÜV SÜD BABT Certification Regulations

2 MAKING AN APPLICATION

2.1 Who can apply

Applications can be made by a CP or by an organisation supplying services to a CP that may affect the latter's billing accuracy. An example of a service organisation is a Billing Bureau.

2.2 What can you apply for

You can apply for certification to one or more, of the following four services:

- Fixed Publicly Available Telephone Service (PATS) (Annex B)
- Mobile Publicly Available Telephone Service (PATS) (Annex C)
- High Speed Internet (i.e. Broadband) (Annex D)
- Voice over Internet Protocol Services (VoIP) (Annex E)

The Annexes shown refer to the Annexes in the Direction.

Those UK CPs required to seek Approval must select either, or both, of Annex B and Annex C as appropriate.

Certification of Wholesale services can be sought by any Applicant.

Examples of the types of services provided:

- Mobile CP providing services to Mobile Virtual Network Operator (MVNO)
- Fixed CP offering Wholesale Line Rental (WLR) services

Examples of the types of data provided:

- Call progress signals (e.g. SS7)
- Unrated electronic data records
- Rated electronic data records
- Non-recurring items such as installation charges

A UK CP subject to GC11.3 is required to seek Approval for Wholesale services if they provide data to another UK CP that impact on that CP's end-user customer billing.

For each of the above services that you have selected, you may choose also to apply for Certification to Annex F, covering Undercharging Detrimental to End-Users.

TÜV SÜD BABT consider it an advantage for Applicants to apply for Annex F certification. Customer's confidence in bills depends on the bill being complete and correct, not just avoiding overcharging. Additional TÜV SÜD BABT charges due to the addition of Annex F are minimal.

2.3 Preparation for an application

Prior to formal submission (either as a part of your decision making process, or to ensure efficient progress of your application) you are recommended to discuss your application with TÜV SÜD BABT. This will give you the opportunity for an early estimate of the costs, timeframes, and documentary aspects associated with the process. If the discussion includes a meeting then, provided the meeting is minuted, this meeting may form part or all of the Initial Assessment *(see section 3.5)*.

We require you to appoint two specific persons to manage your relations with TÜV SÜD BABT.

The first is a Senior Manager to manage the relationship with TÜV SÜD BABT and is authorised to enter into the agreement referred to in section 1.3, above. The Senior Manager is required:

- "to provide the strategic direction for the implementation of the Direction" within your organisation,
- "to act as the escalation point" for TÜV SÜD BABT, and
- to appoint the second person (see below), "ensuring that they are of sufficient capability and experience to carry out the role".

Where Approval is being sought this person will be responsible for managing the relationship with Ofcom.

The Senior Person must hold sufficient authority to be able to ensure that adequate budgetary provision is made for the entire Certification (and Approval) process. Ideally this is a board member.

The second person is the Billing Accuracy Programme Manager (BAPM), who will be responsible for "the day-to-day operation management". The BAPM must "have the authority to enforce compliance internally" within your organisation, and will be the usual point of contact with TÜV SÜD BABT. Examples of people suitable to become BAPMs are Billing, Revenue Assurance or Technical System Managers.

Where approval is being sought the BAPM will act as the Ofcom Billing Accuracy Programme Manager (OBAPM) *[see Direction clause A3.5]*

2.4 How to apply

The application is to be made on form BABT 685 and sent to TÜV SÜD BABT in Walton-on-Thames. It will be accepted

- By mail or Fax (for details see the Foreword); or
- By Email: to customer.services@babt.com

An application form should normally be signed by a member of the applicant company. Where an application form or notification of a change is signed by an authorised representative instead of a member of the applicant company a letter from the applicant company appointing them must be included with the submission.

TÜV SÜD BABT will formally acknowledge receipt of the form.

2.5 Information to be supplied on the application

Information related to the following is required on the application form:

- Name and registered address of the Applicant
- Name and position of the Senior Manager
- Name and contact details of the BAPM
- Whether you are a UK CP providing PATS and have a relevant turnover in your most recent complete financial year exceeding £40 million (Approval is required).
- The Annexes you require Certification against: Annex B, C, D, or E or any combination of these and Annex F.
- Whether you require Certification for Wholesale, Retail or both service types
- Identification of the Public Electronic Communications Services relevant to the Total Metering and Billing System for which Certification is sought. (see section 8.2)

TÜV SÜD BABT maintains strict confidentiality with regard to its clients' matters. If you wish to authorise TÜV SÜD BABT to discuss your application with any other person or organisation acting on behalf of, but not employed by, your organisation, this must be done in writing. However, your organisation retains all intellectual property rights in the application and will be responsible for paying all fees.

You can indicate on the BABT 685 form if you wish your application to remain confidential until formally certified. Please note this option is not available to CPs seeking UK Approval[4].

Where the system or scope originally declared changes significantly or where the response cycle becomes protracted TÜV SÜD BABT reserves the right to cancel the application and require that a new application be submitted. Any costs due for the first application will still be due.

[4] Please note that, for applications for UK Approval, Ofcom have the legal power under Sections 135 to 145 of the Communications Act 2003 to require TÜV SÜD BABT to disclose to them such matters pertaining to your business as they may direct. Be aware that this will include the fact of your application for Approval, which will be made public.

3 PROGRESSING YOUR APPLICATION

3.1 General

The following activities are performed in the process to enable Certification and Approval to be granted:

- Supply of Documentation: BABT680 (this document), along with an Application Form (BABT685) and the Certification Regulations.
- Assessment of your Application
- Preparation of an Approval Plan which will be submitted to Ofcom for endorsement, for those UK CPs seeking Approval
- Initial Assessment
- Full Assessment
- Consideration of Measurements
- Certificate Decision
- Notification (for UK regulatory approval)
- Approval Decision (for UK regulatory approval)

3.2 Assessing your application

TÜV SÜD BABT will formally acknowledge receipt of the application and allocate a reference number to the application.

TÜV SÜD BABT will allocate one of its metering and billing experts as your prime contact. The prime contact will arrange one or more meetings with the BAPM. The purpose of the meetings is to:

- establish the completeness and acceptability of the application;
- Identify the information to enable the assessment to progress and the provision of such information
- define the anticipated programme of work which must be completed by both you and TÜV SÜD BABT in order to complete an assessment of your TMBS. Unless it has already been undertaken, this will include an Initial Assessment. It should also allow for submission in due course of your High Level Description document (HLD) and Measurement Strategy document as required by the Direction;
- allow TÜV SÜD BABT to prepare a proposal for a contract (see section 3.3)
- establish progress reporting processes with you;
- establish processes for the management of changes to the TMBS (see section 8.10), if required, during the period leading up to Certification (and Approval).

These meetings may precede or follow receipt of the Application.

3.3 Contract for work

The Application Form is a formal request for Certification and where appropriate Approval.

However, the work described in section 3.1 is carried out under annual contracts (or other agreed periods) between you and TÜV SÜD BABT. You will be sent a proposal for each contractual period. You may request that a proposal be issued for an Initial Assessment *(see section 3.5)* only.

Note any significant information is missing or a major concern remains unresolved work progressing application may have to be suspended pending the resolution

Where the proposal includes an Initial Assessment it will assume that the work commences within 10 weeks of contract signature. If this is not the case, the amount of effort necessary may require adjustment.

The proposal will contain an acceptance sheet, which you will be asked to sign, accepting the proposal and the terms and conditions attached to it. On receipt of this by TÜV SÜD BABT, it will be countersigned by one of our directors and a copy returned to you.

On receipt by TÜV SÜD BABT of a purchase order covering the agreed period of work, you will receive a confirmation of your order. We will then commence the programme of work.

Towards the end of each contract period, TÜV SÜD BABT will review the work required for the coming period, either towards Certification (and Approval) or its maintenance. A further proposal will be provided to you, and the work undertaken on receipt by TÜV SÜD BABT of a purchase order and signed proposal.

3.4 Expenses and Fees

Proposals for work contain budgetary estimates of the time required, certification fees and expenses arising from an application which are likely to be charged by TÜV SÜD BABT within a contract period.

Fees are charged at a daily rate according to the time actually spent by TÜV SÜD BABT assessors on certification (and approval) activities, both on- and off-site. Expenses are charged at cost.

We will invoice you monthly in arrears for the work done by assessors in each month. Expenses will be invoiced 2 months in arrears for expenses incurred by assessors in each month. Certification fees will be invoiced with the first monthly invoice.

Note that the contracts described in section 3.3 include all the fees described in the Certification Regulations.

3.5 Initial Assessment

The purpose of Initial Assessment is to establish the current readiness of your organisation for Certification. A member of the TÜV SÜD BABT team, usually the prime contact, will agree with your BAPM a programme of interviews. These will be with those members of your staff responsible for processes directly or indirectly affecting the accuracy of metering and billing.

The outcome of the Initial Assessment will be a report that lists your company's strengths and weaknesses with respect to metering and billing. Weaknesses will be categorised according to the industry standard definitions[5]. You will be given the opportunity to comment on a draft of the report and to have any errors of fact corrected before final issue.

If an application is made for additional services requiring modification to the TMBS, an Initial Assessment would be limited in scope to those areas not already assessed.

3.6 Preparation of an Audit Plan

Once the Initial Assessment has been reported upon, it is normal for a programme of corrective action to be planned. Some remedial actions may be taken in a short timescale, others may take longer to resolve.

Once remedial action has been taken for a particular process, TÜV SÜD BABT will wish to undertake a formal audit of it to confirm that the original deficiency has been rectified and that no additional deficiencies have arisen.

A programme of audits, known as the Main Assessment, can thus be generated from the corrective action plan. Initially this will be provisional and dates will be fixed upon review of progress *(see section 3.7)*. The programme may be modified at any time to address newly discovered weaknesses or avoid work found to be unnecessary. We will use our best endeavours to keep fees to a minimum.

[5] The Direction, Annex A, Definitions and Interpretations

It should be noted that, if the need to achieve Approval is mandated by Ofcom, excessive delay may be viewed unfavourably by the regulator.

3.7 Main Assessment[6]

This will be directed towards establishing that your TMBS complies with the Direction. Such work will comprise a combination of *technical audits*, including *witnessed audits* and *desk audits* as necessary, and *progress meetings*.

Please note the following: We may, when conducting these assessments, require access to your sub-contractors' premises and/or documentation. It is recognised that a contractual right to such access may not be achievable. However, we would ask you to use your best endeavours to obtain such access. Our budgetary estimates assume that any access required is forthcoming, and may need to be revised if that is not the case.

3.8 Progress Meetings

TÜV SÜD BABT's prime contact will meet your BAPM at regular intervals to review progress towards obtaining or maintaining Certification (and Approval). Such meetings are an essential part of the certification process . Either side may ask appropriate experts to assist with the review. The agenda will include a review of progress towards meeting the requirements of the Direction and of this document. It will also include a review of:

- recovery plans following an Extraordinary Performance Failure [*see Direction clause A3.5.7.3*]
- identified weaknesses (including findings from technical audits and progress with corrective actions)
- measurement data (if any)
- the details of forthcoming modifications to the TMBS

If any special conditions have been attached to an existing Certificate (and Approval), compliance with them will be reviewed. The meetings will be formally minuted.

TÜV SÜD BABT will not provide consultancy to redesign parts of the TMBS. However, progress meetings usually discuss the shortcomings that may have been discovered and debate the relative merits of possible solutions and enhancements.

3.9 Consideration of Measurement Results

The Direction contains numerical performance requirements for accuracy and reliability of your TMBS. Once you have agreed a measurement strategy with TÜV SÜD BABT and have implemented it, performance reports should be produced monthly and presented to TÜV SÜD BABT. Performance against the Direction should be calculated both on a monthly basis, and also over a rolling 12-month period. When considering whether your TMBS should be Certified (or the Certification renewed), we will normally look at the aggregate of measurement results taken over a 12-month period, in order to average out inevitable monthly fluctuations. However, if these fluctuations are significant further investigations into the reliability of the TMBS may be necessary. The relationship between you and TÜV SÜD BABT should ensure that the reasons for any such fluctuations are investigated on an ongoing basis, rather than creating a potential delay in granting or renewing Certification.

A minimum of 6 months measurement data may be acceptable for certification purposes provided that TÜV SÜD BABT is satisfied that the TMBS is consistently performing well within the required standards and that all other requirements for Certification have been met. It is possible that part of the measurement period offered may predate the application for Certification; provided that you can demonstrate that throughout this period the measurement system conformed to that subsequently agreed with us and had been accurately reflecting the performance of the TMBS.

3.10 Certification and Approval Decision

[6] The Direction clause A3.5.1.4

When the prime contact judges that you have met, and are likely to continue to meet, the requirements of the Direction, he will place the evidence from measurements, technical audits and progress meetings before a suitably qualified TÜV SÜD BABT Technical Certifier who has not had any prior involvement in your assessment. The Technical Certifier will review the evidence and report on his findings to TÜV SÜD BABT's Certification Manager with a recommendation to grant Certification, or not, as appropriate. Once certification is granted, if Approval is required, there will be a period for Notification (see section 5) prior to Approval being granted (see section 7).

3.11 Failure to achieve Certification

An Applicant seeking only certification may normally take as long as they require to achieve certification. Where the systems or scope originally declared change significantly or where the response cycle becomes protracted TÜV SÜD BABT reserves the right to cancel the application and require that a new application be submitted. Any fees due for the first application will still be due

However, if you are a UK CP required to seek Regulatory Approval, Certification, and hence Approval must be achieved within the timescales defined in clause A3.5 of the Direction.

If after due consideration, TÜV SÜD BABT see little prospect of you achieving certification, TÜV SÜD BABT will notify you in writing giving reasons. You are then required to inform Ofcom what action you intend to take to rectify the absence of approval, or that you intend to cease operation of the relevant whole or part TMBS, in both cases giving timescales. Please note the warning under section 2.5 of this document regarding Ofcom's powers to require disclosure.

4 CERTIFICATION

4.1 Certificate Issue

If the Certification Manager is content to grant Certification, a certificate will be prepared and issued to the Applicant. The certificate, together with its annex, will specify:

- the name and registered address of the Communications Provider
- the identification of the Public Electronic Communications Services relevant to the TMBS being certified
- the annexes from the Direction being certified
- conditions to be complied with to maintain the validity of the Certification.

The conditions may be for any purpose, and may include a programme of work which the applicant shall carry out with related timescales.

If the Applicant is a UK CP required to seek Approval and the certificate includes compliance to either Annex B and/or Annex C of the Direction then a Notification will be issued (see section 6).

Initial certificates are issued with a duration of 39 months to align better with the Notification process.

TÜV SÜD BABT also keep the following records for the following periods:

- Applications, Recommendations, Notifications, Certificates and all the details on a certificate for 10 years after the last significant file activity;
- Audit Schedules, and Audit Reports, for two cycles or 6 years whichever is the longer.

4.2 Continuation

Initial certificates are issued with a duration of 39 months to align better with the Notification process. Towards the end of this period the Applicant/Holder will need to apply formally for continuation of the existing certification and as appropriate approval; this is also known as *renewal*. (Note that this is distinct from annual contract renewal, *see section 3.3.)*

An annual intermediate assessment of the results of the previous year's audits and measurement data will be conducted at the end of Year 1 and Year 2 to ensure ongoing compliance.

Shortly before the expiry date specified on the existing certificate, TÜV SÜD BABT will send you a reminder that your certification is about to expire. You should then complete a BABT 685 form *(see section 2.4)*.

4.3 Modification

From time to time it may be necessary to vary the scope or conditions of a Certificate. This may apply where the Applicant's corporate details have changed or there is a substantial change to the description of the PECS relevant to the TMBS. In this case the Applicant should notify TÜV SÜD BABT, either formally by letter or at a meeting which is formally minuted. If TÜV SÜD BABT agrees to the modification, a revised Certificate will be issued. If the Applicant is required to hold UK Approval then the notification process described in section 6 will be initiated.

4.4 Withdrawal

An Applicant may wish to discontinue Certification of a particular communications service. As for modification the Applicant should notify TÜV SÜD BABT, either formally by letter or at a meeting which is formally minuted. Note that if the service is already approved, then the service must be either scheduled for withdrawal or have already been withdrawn. In this case, the notification process described in section 6 will be initiated. (*See also section 7.4*)

Where TÜV SÜD BABT wishes to withdraw a certificate this will not be done without issuing prior notification to the Applicant (and Ofcom where an approval/or notification has been issued) before withdrawing the certificate

5 TÜV SÜD BABT APPROVED PRODUCT MARKING

Holders of TÜV SÜD BABT Metering and Billing Certificates may use the BABT Approved Product Mark in connection with the certified products and on advertisements under the conditions stipulated in the Certification Regulations for products.

Details of the rules and colour schemes for the mark are defined in document BABT AP014
"Marks associated with TÜV SÜD BABT Certification Schemes"

Note: Sections 6 and 7 only apply to CPs seeking Regulatory Approval.

6 NOTIFICATION

Under Section 49(1) of the Act, before TÜV SÜD BABT issue, modify or withdraw any Approval, Ofcom is obliged to publish a Notification which:

- states that TÜV SÜD BABT proposes to give, modify or withdraw the Approval;
- provides the text of the Approval;
- sets out the effect of the issue, modification or withdrawal of the Approval;
- gives the reasons for the proposal; and
- specifies how and by when representations may be made to TÜV SÜD BABT about the proposal.

It has been agreed with Ofcom that TÜV SÜD BABT will publish a Notice of Consultation on its website providing the above details. Ofcom will then publish a Notification making reference to the TÜV SÜD BABT Notice. The date by which representations are to be made will be at least one calendar month from the date of publication on Ofcom's website. TÜV SÜD BABT will liaise

with Ofcom to establish an effective date, taking into account web publishing delays within each organisation.

7 APPROVAL

7.1 Issue

At the expiry of the notification period (see section 6), TÜV SÜD BABT will consider all representations received, and will summarise them in a report on the TÜV SÜD BABT website. An Approval will be prepared ready for issue to the applicant, incorporating as TÜV SÜD BABT sees fit any modifications resulting from the notification. The Approval will specify:

- the name and registered address of the Communications Provider
- conditions to be complied with to maintain the validity of the Approval
- reference number of the Certificate of Technical Compliance*(see section 4)*

The Approval will then be issued and a copy will be sent to Ofcom.

Current Approvals issued by TÜV SÜD BABT will also be published on the TÜV SÜD BABT web site[7].

7.2 Continuation

An Approval will normally be granted for a period of three years. Continuation of Approval is based on maintaining a valid Certificate (*see section 4.2*).

7.3 Modification

From time to time it may be necessary to vary the terms or conditions of an Approval, usually as a result of a change to Certification *(see section 4.3)*. This may apply where the CP's corporate details have changed or there is a substantial change to the description of the PECS relevant to the TMBS. In this case the CP should notify TÜV SÜD BABT, either formally by letter or at a meeting which is formally minuted. If TÜV SÜD BABT agree to the modification, the process described in section 6 will be initiated.

7.4 Withdrawal

If a CP subject to Approval has notified TÜV SÜD BABT that it wishes to discontinue a Certificate of Technical Compliance or TÜV SÜD BABT proposes to vary or withdraw a Certificate *(see section 4.4)* this will automatically lead to TÜV SÜD BABT issuing a modified Approval certificate detailing the withdrawal.

It is likely that Ofcom will be, or have been, involved in discussions on the matter. This action will not be done without discussion and prior written warning. Whether withdrawal is initiated by the CP or TÜV SÜD BABT, the process described in section 6 will be initiated prior to issuing the modified Approval.

8 THE BASIS OF METERING AND BILLING CERTIFICATION AND APPROVAL

8.1 Scope

Most CPs offer a range of services. Often, different service delivery and/or billing platforms are used for each product, or group of products. These may range from legacy systems to state-of-the-art. Gaining Certification and when appropriate Approval for the whole range of services simultaneously may therefore be impractical. TÜV SÜD BABT, after assessing the contribution of each identifiable product or service that contributes to the overall performance of the TMBS, will consider restricting with your agreement the initial scope of certification to specific services. As

[7] http://www.babt.com/cps-approved-tmbss.asp

experience is gained, the scope of an existing Certification can be extended or separate Certificates given. We strongly recommend you to discuss with us at an early stage how Certification and Approval should be structured.

8.2 Total Metering and Billing System

The meter and billing process can be represented as a system design comprising both equipment and human activity. In its entirety it is known as the Total Metering and Billing System (TMBS). The following are conceptual diagrams of a TMBS operated by a typical Applicant:

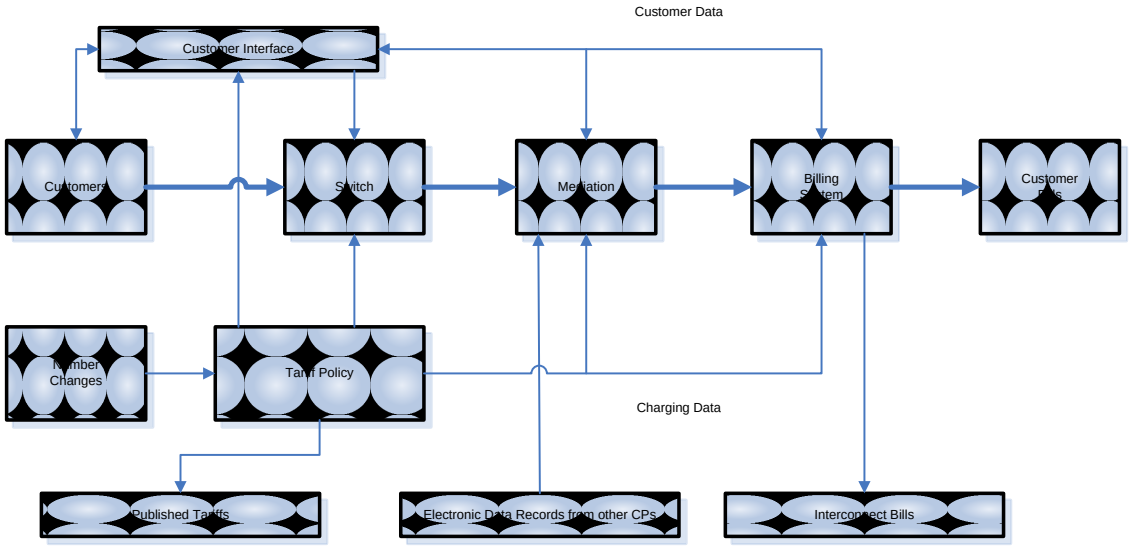

Figure 7.1: Typical TMBS diagram for Fixed-Line Services

Note: The functional blocks in this diagram may all be owned and operated by a single Body Corporate, or some of them may belong to Sub-contractors, Suppliers, Resellers, and Billing Bureaus etc. In the latter case, the Contractual arrangements between the various parties effectively form part of the TMBS for the purposes of assessment and Certification.

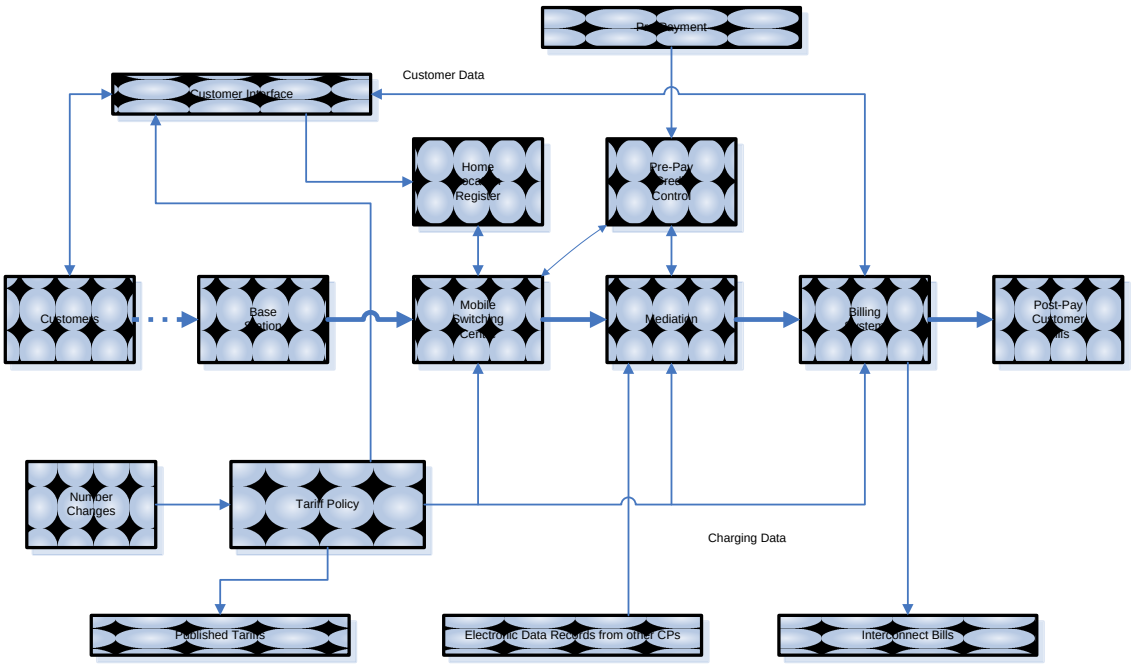

Figure 7.2: Typical TMBS diagram for Mobile Services

See note to Figure 7.1

Each of the components and their interconnections represents a mixture of equipment and processes. The equipment may comprise switches, base stations and/or processors, each of which may run various forms of software (e.g. call detail recording, data warehousing, mediation, rating, bill production). Processes include such activities as file transfer, data-fill, error handling, and will operate automatically or with human intervention.

8.3 The Target

The target is compliance with the Direction, clause A3.1 of which states:

> *"Customers cannot reasonably be expected to check the accuracy of all charges made by Communications Providers for services provided, especially where those charges are based on the extent of End-Users' usage of such services.*
>
> *This Direction and its Annexes set out the requirements on Communications Providers to ensure that the risk to customers of being overcharged for their use of Public Electronic Communications Services is reduced".*

The charge *(*or *tariff*) against which accuracy is determined is that actually set before the customer. This may not always be the tariff that the CP intended to set. The tariff can manifest itself in various ways. One or more tariffs may be published by advertisement generally, on a web site, or by bill message to each customer, who selects the desired tariff. There may be an individual contract in operation between your organisation and the customer.

Reduction of the risk of customers being overcharged is best achieved through a programme of self-appraisals as part of Risk Management, which is mandated by the Direction. These should be an all-encompassing and set a benchmark against which subsequent changes can be assessed. The comprehensive nature of the first appraisal is important in order to establish and document which parts of your processes are important, or of no consequence, for Certification purposes. Once Certification has been granted, you should review and, if necessary, update the self-appraisal at regular intervals. Normally, a programme of annual reviews will suffice.

When change to the TMBS is contemplated, you should undertake appropriate self-appraisal before, during and after implementing the modifications. The management of changes to the TMBS is a significant task in its own right, bringing its own problems and recommendations. Refer to section 8.10 for details.

Irrespective of any self-appraisal that you might undertake, we retain the right to conduct our own appraisal of any aspect of your TMBS. Typically, this would occur if a problem was identified for which the cause was obscure, suggesting that something might have been overlooked during self-appraisal. This is additional to our undertaking an audit of the self-appraisal process itself.

It is in the nature of the complexity of metering and billing that post-implementation and routine self-appraisal frequently raise new issues requiring further change.

You are expected to undertake self-appraisal of the TMBS [*see Direction clause A3.4.1*] to determine if it is so designed as to be capable of meeting the requirements of the Direction.

There must be the capability to measure objectively the performance of the TMBS. This is not a trivial process and the applicant must demonstrate the credibility of data obtained from measurement.

Your process management system must not only encompass the entire TMBS but also ensure that links between the various metering and billing processes, including measurement, are effective.

Where the end-to-end TMBS extends over one or more organisations, the interfaces between the organisations must be equally effective.

The TMBS will change with time on the introduction of new equipment, services and processes. The effective management of these changes is vital to avoid the introduction of consequential weaknesses into the TMBS.

Guidance on all of the above matters is provided later in this document. The guidance tends towards a specific proven methodology. You may choose to adopt an alternative methodology to manage the conduct and maintenance of self-appraisal, measurement, process management, change management and the HLD. TÜV SÜD BABT will accept an alternative methodology provided that you can demonstrate to our satisfaction that it is at least as effective as that described here and complies with the specific requirements of the Direction.

8.4 High Level Description

8.4.1 Introduction

Clause A3.4.1 of the Direction requires the Applicant to produce a High Level Description document (HLD) for each TMBS and agree its content with their Approval Body. A HLD is defined to be a detailed description of the basis on which an end-user's use of the electronic communications facilities is assessed for charging purposes. The HLD should contain details of mechanisms which may lead to overcharging that cannot be corrected prior to billing; such details must also be declared in Published Tariffs [*see Direction, clause A3.4.4*].

If Approval is being sought the HLD will be subject to review by Ofcom and the other Approval Body. The latter is bound by the same obligations to maintain confidentiality as TÜV SÜD BABT.

8.4.2 System Description

The system description needs to be sufficient for a person who has no personal knowledge of the system, but has a reasonable level of technical understanding, to comprehend the principles of operation. It must cover service provision and service usage, the latter involving the end-to-end operation of the TMBS. Using the example of a typical CP, service provision would include non-recurring charges (e.g. installation) and recurring charges (rentals); service usage would typically apply from the customer making a call through to the details of the call appearing on the customer's bill, or being decremented from a pre-paid account. Service usage may also include the download of data packets or data items if approval for Data is being sought.

We recommend that the description should also provide a broad understanding of the metering and billing methodology that you employ. Areas of the TMBS which employ different methodologies should be identified. For example, a legacy billing system may lack certain automated checks and might require additional monitoring to maintain an equivalent level of control.

The description should include a summary of the way customer complaints are handled, and their root causes investigated [*see Direction clause A3.4.8.2*].

The HLD should define any equipment accuracy requirements in terms relevant to the Direction, that are to be defined in the procurement specification for any equipment used in the TMBS *(see also Table 1 - Guidance for an effective Process Management System, clause 7.4.2).*

If a suitable high-level description is already available in an existing document then, providing that it is made available to us, the HLD need only make reference to that document.

If an end to end TMBS is implemented by using systems from different Organisations [*see Direction clause A3.4.5 - Interworking between Communications Providers*] the HLD should describe the interaction and dependencies between the Organisations involved in the implementation.

It is not necessary for the HLD system description to provide a detailed commentary on the design of the TMBS. Such detail would merely duplicate other system documentation featuring in the full appraisal.

8.4.3 Presentation of the HLD

The HLD may be in the form of a single document or a series of documents, each addressing different aspects of the TMBS design and operation. In such a case we will regard the HLD as the complete set of documents defined by document references and issue numbers.

The generation of a HLD is likely to need some interaction between you and us. Every situation will be different, and some discussion as to the best approach will save time overall.

You may initially supply an incomplete HLD. However, the missing parts must be supplied before Certification (and Approval) can be granted.

You must regularly review the HLD and maintain it in a current state throughout the period of Certification (and Approval).

8.5 Risk Management

8.5.1 Introduction

Risk management is a discipline with a wide range of applications in many fields. The British Standards Institution (at the time of writing, August 2009) has published in draft:

(a) BS ISO 31000 Risk management. Principles and guidelines on implementation.

(b) BS EN 31010 Risk management. Risk assessment techniques.

These documents establish a sound basis for the management and assessment of risk. TÜV SÜD BABT will be utilising these documents when it assesses compliance to the Risk Management requirements of the Direction, clause A3.4.2.

The Risk Management needed in the present context has a narrower definition than BS ISO 31000. The kind of risk relates to "risk of inaccuracy" rather than the broader risk to business. To demonstrate compliance with the Direction, you need to have a clear understanding of the entirety of the TMBS in question and how its components interact or could interact. This involves the on-going study of the design and realisation of the TMBS and the interpretation of information gained during its operation. The objective is to make an informed judgement on the accuracy and reliability of metering and billing achievable in the system as a whole and confirm that it is fit for purpose. The outcome of this exercise will determine if the TMBS as currently designed is inherently capable of meeting the requirements of the Direction. This process is self-appraisal; it is a requirement of the Direction and guidance is given in section 8.7. Self appraisal is fundamental to the understanding and implementation of Metering and Billing Certification and its importance cannot be overstated. It will in turn be the basis for determining the Measurement Strategy *(see section 8.8)* and the scope of Process Management *(see section 8.9)*.

It is important that every aspect of equipment design, hardware and software is considered, and also that the procedures used for procuring, modifying and operating the equipment are thoroughly investigated. If the TMBS is operated by more than one company, the interactions across the various interfaces need to be carefully considered. See section 8.8.9 [*covering the Direction clause A3.5.5*]

In general, the complexity of metering and billing systems makes it difficult for any Approval Body to conduct its own comprehensive risk assessment of each Applicant's TMBS. Clause A3.4.2 of the Direction makes it clear that you need to carry out an effective assessment of risks within the TMBS.

8.5.2 Identifying and Mitigating Risks

As each appraisal is conducted risks will be identified. It is recommended that you establish a Risk Register, identifying the risk, the likelihood of it occurring and the potential consequences if it did. If you already operate a Risk Management system, TMBS risks may be recorded there. For each risk, mitigation actions must be defined and documented. The Measurement Strategy must define how each risk is monitored and if there is an occurrence how it is measured and reported.

The TMBS will change with time as new equipment, services and processes are introduced. It is necessary to assess the effect of proposed changes and, from time to time, to confirm that effectiveness is being maintained.

8.6 Technical Audits

Technical audits are the principal means by which TÜV SÜD BABT establishes that the requirements of the Direction are met. In general, technical audits assess fitness-for-purpose, whereas quality audits verify that an effective Quality Management System (QMS) is in place and that all the processes and procedures forming a part of that QMS are being applied.

A technical audit may take the form of a review of documentation and records held by you (or your sub-contractor). If the documents or records are sent to us, this becomes a *desk audit*. It may take the form of a specific audit of your appraisal, process management or measurement system procedures, processes and/or activities.

Normally on an annual basis TÜV SÜD BABT will conduct technical audits on each item in the work programme *(see section 3.6)* but this may be more frequent if required. We may, however, conduct additional audits on any relevant element / part of the system on a random sampling basis or as a result of notification of a specific weakness.

8.6.1 Technical Audit of Self-Appraisal

From time-to-time TÜV SÜD BABT will carry out technical audits on your approach to appraisal. We will also audit the methodology used in, and the findings from, some of the self-appraisal studies and the way they are managed to confirm that their breadth, depth, independence and completeness meet the requirements. The findings of these technical audits may lead you to conduct further appraisal studies and/or revise the study reports. To validate your findings, we may investigate in depth samples of self-appraisal studies.

TÜV SÜD BABT may conduct a detailed technical audit of any aspect of the TMBS to verify the accuracy of the HLD.

8.6.2 Technical Audit of Measurement Systems

TÜV SÜD BABT will undertake technical audits of the methodology used to extract measurement results and the accuracy and deployment of any test equipment used to generate them. The findings of these technical audits may lead to refinement of your measurement strategy.

Specific aspects of measurement which may form the basis of technical audit relate to the capability of the measures defined in your measurement strategy, individually and collectively, to provide a true measure of performance.

8.6.3 Technical Audit of Process Management System

TÜV SÜD BABT will audit your Process Management system for compliance with clause A3.4.3 of the Direction. Where you can show a current accredited certification of your Quality Management System to ISO 9001: 2008 (or ISO9001: 2000 until November 2010), TÜV SÜD BABT will not seek to audit those parts of the TMBS within the scope of the QMS certification unless evidence is found elsewhere of non-compliance with clause A3.4.3 of the Direction. TÜV SÜD BABT will expect to be advised of any non-conformities relating to the TMBS raised by the QMS certifier/registrar and of progress to their resolution.

TÜV SÜD BABT will also take into consideration the results of other formal external audits, such as Sarbanes Oxley, when determining the scope of audits to ensure that repetition and audit fatigue is minimised.

We may accompany your internal auditor on a routine QMS audit for the above purposes or, as part of a Technical Audit, to explore a particular topic without subjecting your staff to “audit fatigue”; this is a *witnessed audit*.

We will audit the process for identifying, recording, investigating and dealing with customer complaints for equable treatment as well as the matters contained in clause A3.4.8.2 and the appropriate annexes of the Direction.

8.6.4 Technical Audit of Change Control

TÜV SÜD BABT will audit the processes used by your organisation for managing change. This will include audits of selected changes which are considered to have the potential to make significant impact upon the performance of the TMBS. Depending upon the circumstances, it may also include reviewing records, interviewing those responsible for specifying and carrying out testing and such other investigations as are necessary for us to be satisfied that Change Management is fit-for-purpose.

8.7 Self Appraisal

8.7.1 Introduction

It is important that every aspect of equipment design, hardware and software is considered, and also that the procedures used for procuring, modifying and operating the equipment are thoroughly investigated.

Undertaking appraisal according to the provisions of this section, and under our guidance, is intended to demonstrate compliance with clause A3.4.1 of the Direction.

In general, the complexity of metering and billing systems makes it difficult for us to conduct our own comprehensive appraisal of each Applicant's TMBS. In addition we consider that you need to carry out an effective appraisal of your system (that is: *self-appraisal*) if you are to have full confidence in it. Provided we can satisfy ourselves that effective self-appraisal has been undertaken there is no reason to repeat your detailed work.

8.7.2 Elements of Appraisal

8.7.2.1 General

You may already be carrying out much of what is required for self-appraisal, although it may be called something different. "Design Verification", "Verification, Validation & Test", "Billing Integrity Verification", "Data Integrity Assessment", "Revenue Assurance", etc are examples of activities that may go some way towards effective appraisal. Certain parts of existing change control processes or audits may also be relevant.

The appraisal strategy should be discussed with us at an early stage. This discussion will include a review of existing activities to determine their adequacy or contribution.

8.7.2.2 Partitioning

You should think carefully about your TMBS, and decide an overall strategy for appraisal. It will be necessary firstly to identify the overall extent of the TMBS in terms of its end-to-end performance. This includes identifying those parts of your processes that have no effect on the accuracy of metering and billing. Most systems are sufficiently complex to make it advisable to partition the TMBS into subject areas which are self-contained, and have readily defined interfaces to the remainder of the TMBS. Examples might be:

- Switches of each design
- Billing Data Collection / Mediation System
- Data Transfer Systems: electronic, Data CD, tape, etc.
- Rating Engine
- Billing System
- Tariff Database Management System
- Tariff Publication process
- Customer Database Management System
- Data Audit Systems
- Data Recovery Procedures
- Management / Revenue Assurance Systems / Controls
- Disaster Recovery / Business Continuity Procedures
- General features, serving several of the above

Depending upon the size of your operation, some of these may be combined or further sub-divided. For certain Applicants, e.g. switchless resellers, some of the above may be subject to sub-contract [*see Direction clause A3.5.5*].

Partitioning should take account of main data flows such as those:

- from a service being used to a bill being despatched
- for activating billing and service for a new customer

- to change network configuration and/or tariff data

When the partitioning exercise has reached tentative conclusions on the range of self-appraisal studies needed, you should undertake a gap analysis to confirm that the range covers the entire TMBS. Where gaps are found the range should be adjusted accordingly. The outcome of the completed partitioning exercise should be a programme of self-appraisal studies. The programme should take into account the relative importance *(see section 8.5)* of each part of the TMBS.

The following sections describe how the outputs from each study should be treated.

8.7.2.3 Strengths

As each self-appraisal study is undertaken, it will reveal the strengths and weaknesses within the TMBS. The strengths should be acknowledged and recorded to provide a guide as to best practice when considering improvements elsewhere.

A particular strength could be the quality and extent of management information available. During each study, you should note every potential opportunity for a management statistic that might contribute to a measurement of TMBS performance. Examples include:

- the number of errors found when comparing each relevant database with its trusted source
- the percentage of chargeable event records failing to pass through the system and be allocated to bills because of some error or omission in the data
- the number and nature of errors in published tariffs
- the number of instances of data loss due to communications and equipment failures, processor restarts, loss or corruption of tapes or disks, etc.
- the number of instances where any relevant clock was wrong and by how much it was corrected.

Each opportunity should be considered for its usefulness when designing the measurement strategy *(see section 8.8).*

8.7.2.4 Weaknesses

As well as strengths, each self-appraisal study will reveal weaknesses within, and limitations on the accuracy of, the TMBS. Weaknesses can also be revealed from:

- reports of incidents – e.g. accidental deletion of chargeable event records
- examination of customer complaints [*see Direction clause A3.4.8.2*]
- internal audits undertaken by the Applicant *(see section 8.9.2)*
- audits undertaken by TÜV SÜD BABT
- third-party audits

You are expected to identify all sources from which weaknesses can be deduced. Subsequently, you should maintain a log of all weaknesses revealed, together with their relative importance, details of their investigation, proposals for corrective action and progress towards their resolution. As soon as possible, you should inform us of all weaknesses in, or limitations on the accuracy of, the TMBS, from whatever source, which you consider may have a significant impact on metering and billing accuracy.

We encourage you to align the indicators of relative importance within your log of weaknesses to the industry-standard categories of deficiencies [see *Direction Annex A*]. We will either confirm or advise modification of the category allocated, in consultation with you.

Where a CP holds Approval, Ofcom requires Approval Bodies to advise them whenever a category 1 non-compliance is identified in a approved TMBS.

We will expect you to undertake corrective action within an agreed timescale to resolve the weakness. As a precursor to corrective action, you should establish for each weakness or

limitation a monitor point so that improvement, or otherwise, can be measured. The monitor points form an input to the measurement strategy *(see section 8.8)*.

As well as weaknesses, self-appraisal studies may reveal gaps in the TMBS omitted either from its initial definition, during the partitioning process or as a result of subsequent changes to the TMBS or its scope. You should fill such gaps by redefining the TMBS, if necessary, and performing additional self-appraisal studies.

8.7.2.5 Relative Importance

Not all parts of the TMBS will have the same significance on the accuracy of metering and billing in terms of the system-wide performance referred to in the Direction. It will be necessary to establish the relative importance of each part.

During self-appraisal, each process, procedure and item of equipment forming a part of the TMBS should be evaluated to determine its potential impact on accuracy. For example if a billing platform handles all call records then that platform, together with its operational procedures, will have a high importance. On the other hand, a particular type of switch which serves 10% of customers, and which carries 7% of calls in the network, might be regarded, with its operational procedures, as having a medium importance, and so on. Such an analysis is the essential input to the determination of the emphasis and priorities to be placed on resolution of weaknesses in equipment and procedures.

Relative importance also provides an input to the establishment of a measurement strategy by indicating the emphasis to be placed on measures at different points within the overall metering and billing process *(see section 8.8)*. It also forms an input when deciding the volume and frequency of internal audits *(see section 8.9.2).*

8.7.3 The Self-Appraisal Process

8.7.3.1 Management of Self-Appraisal

In view of the all-embracing nature of self-appraisal, including the appraisal of changes, it is important that the process itself is sufficiently robust to withstand organisational change and staff turn-over. Experience demonstrates that clear ownership of the process has to be a necessary part of its management, so that it remains effective throughout, and subsequent to, organisational and personnel changes.

Ownership can be assigned to a post or an individual. In either case, the process should define how change of ownership is to be managed.

8.7.3.2 Appraisal Personnel

Self-appraisal needs to be carried out by technically competent people who know, or can readily understand, the systems being appraised, but who are not so intimately involved as to be unable to take an independent view. They must be able to identify strengths, weaknesses and potential weaknesses, and make recommendations in an impartial and professional manner. Self-appraisal is an example of audit activity. Therefore, we will expect you to apply the requirements of ISO 9001:2008 clauses 6.2.1 and 6.2.2 when selecting appraisal personnel, and to apply the following requirement from ISO 9001:2008 clause 8.2.2:

"Selection of auditors and the conduct of audits shall ensure objectivity and impartiality of the audit process. Auditors shall not audit their own work."

The knowledge and skills advisable to complete an effective self-appraisal therefore include:

- knowledge of the technical and operational aspects of the system being appraised. However, system designers may not be best placed to conduct appraisal. Consultants or others who have designed comparable elements of a TMBS in another context, e.g. for export, may have something valuable to contribute. Those responsible for acceptance testing proprietary products for inclusion in the TMBS may be able to appraise those products, and may already be meeting some of the requirements of this section. However, care may need to be taken to avoid conflicts of interest.
- an auditor's approach to assessing the effectiveness of controls built into the system. Formal qualifications as an auditor may be of benefit.

- experience in the design, implementation and maintenance of quality management systems to ISO 9001 in order to assess the management controls and documentation supporting the TMBS.
- training in techniques such as brainstorming, valuable when attempting to identify all possible "What-if" situations. This is to ensure that any potential failure or combination of circumstances that might affect meter accuracy is identified and analysed.

It may be necessary to draw together a number of people to form a team for effective self-appraisal, and/or to enhance the skills of appropriate people by specific training in the above aspects.

8.7.3.3 Questions to Ask During Appraisal

Appraisal should not be limited to hardware and software. In practice, about 80% of problems within a TMBS have been found to be human-related. For example, a system could have a clock that is accurate to a millisecond per annum. However if there is a procedure to set the clock by manual intervention, say from the speaking clock, then it will not give the accuracy expected at first sight.

The following set of questions may be useful in considering each aspect of appraisal:

- What is the purpose of the item considered?
- How is it deployed?
- What is its impact on metering or billing accuracy?
- Is it fit for purpose?
- Does it cover every eventuality?
- What are its interfaces, where and how are they defined? Are they covered by other appraisal areas?
- What could cause a failure?
- What will be the effects of a failure?
- What controls are in place?
- What is the effect of staff training (or lack of it), or changes to personnel?
- What measures are used to record performance?
- Are the measures obtained interpreted in terms of the Direction?
- Can a threshold value be applied to the measures which, if exceeded, will justify stopping the issue of bills?
- To whom are the measurement results reported? Is Top Management aware if compliance with the Direction is in jeopardy?
- What improvements are necessary?

8.7.3.4 How an Appraisal should be Recorded

The appraisal of each subject area should be documented in a form that allows both you and us to assess the performance of that part of the TMBS. Also, as the process is continuous, the personnel undertaking self-appraisal and making use of the findings will change from time to time. It is vital, therefore, that there is continuity of information about the TMBS and how it develops.

Each self-appraisal study should be recorded to a depth such that:

- you can use its findings to make further improvements to the TMBS;
- it can be understood by personnel taking over responsibility for further appraisal from the original author;
- reference can be made to it later, either by the author or others; and
- it can be audited effectively by us.

We do not specify what format or medium should be used for the record. However, as self-appraisal is a process, we would expect compliance with ISO 9001:2008 clause 4.2.4 – Control of records *(see Table 1)*

The way the appraisal is documented should include the following elements:

- brief identification of the precise equipment and/or procedures involved in the appraisal, by build-level, revision number, etc
- a list of technical experts who have been involved in the appraisal and/or are available to answer technical enquiries on the subject area
- the relative importance *(see section 8.7.2.5)* of the subject area
- identification of the future plans for this area, e.g. will all of this type of equipment be removed from service within a short period? Will a hardware or software upgrade significantly alter the system in the foreseeable future? Will the relative importance significantly alter as a result of new equipment, procedures or services being introduced in parallel or series with the area being appraised?
- a system description or, preferably, a reference out to available documents that contain such a description. Ideally this should be sub-divided into an equipment description, followed by a procedures description. Where an existing system description, perhaps part of the original equipment supplier's documentation, is used by cross-reference, care needs to be taken to ensure that the principles of appraisal have been fully applied in its inclusion
- a list of weaknesses identified, with recommendations for corrective action. These can sometimes be included in the system descriptive text, so that each is read in context.

The list of weaknesses, suitably categorised [*Direction Annex A*] should be added to the log described in section 8.7.2.4.

8.7.4 Other Considerations

8.7.4.1 Published Tariffs

TMBS accuracy is not limited to the accuracy of internal systems within the TMBS but also extends to the information provided to customers as published tariffs and terms and conditions. A TMBS that internally creates accurate customer bills, which disagree with the published tariff information are inaccurate within the context of the Direction. Published tariffs can be produced using many media forms, contracts, price guides, advertisements, etc. Each method of production should be subject to appraisal to ensure the accuracy of the information produced.

The Direction requires the CP to identify one source of material as being "known good" with all others deferring to it in the case of a conflict or omission.

8.7.4.2 Databases

The databases upon which accuracy of metering and billing depend may include:

- customer profile data, indicating for example which tariff package is appropriate to each line
- digit analysis tables, to determine the locations of calling and called parties, and derive the distance between them or in which country(ies) they are located, also to identify special codes such as free calls, premium and mobile services, and calls attracting a fixed fee
- tariff tables to price each type of chargeable event, at each time of day/week/year, where applicable, and for each customer tariff option
- discount or "Bundle" information, affecting the final price to the end-user
- system parameters which allow an Applicant to select a mode of operation from a variety of options available within the design of equipment; thus enabling either a CP to tailor the equipment to the needs of their particular network or to their particular country's telecommunications system needs, or an Organisation to meet their clients' needs

- polling or delivery schedules, causing billing related data to be collected and delivered in a timely fashion for the preparation of bills and before storage capacity is exceeded at any stage of the process
- data transformation tables, to allow the translation of usage information into a different format.

These databases may be resident on switches, data management systems, mediation systems, billing systems or customer office support systems. Each will need to be kept up to date, and in many instances one database will need to be kept in step with another. For example, if a customer opts for a bulk-discount tariff, the system supporting the order-taking department may need to update databases in the rating engine, billing system and/or switches to apply the discount.

Digit analysis tables will continually change in response to international and national numbering changes. For example, national regulatory authorities regularly allocate new codes for new services, and make changes to the numbering scheme to cater for growth in services.

The appraisal will need to consider whether all necessary and valid sources of information are being fed into the databases, and whether there is a clearly identified "Trusted Data Source" against which working data is validated to detect any discrepancies that may have crept in during day to day management of the systems. The number and nature of errors found should form a management statistic that will contribute to the measurement of performance for Approval purposes.

8.7.4.3 Accuracy of Timing, Quantity and Count

Where charges are based upon duration of chargeable events or time of day, events such as call answer and call clear require validation periods to prevent premature metering and/or release of calls. Validation periods, which may be technology-dependent, are therefore likely to be material to determining call commencement and call termination. In addition there will be delays in signalling call events across a network that may be material in determining accuracy. These factors often require a reference point to be defined at which the accuracy of metering is to be judged.

Where the time recording of the start and finish of a call is carried out at different points in the network this needs to be accounted for in determining the accuracy of call duration.

Different types of service may utilise different network elements which may in turn introduce discrepancies between clocks and introduce inaccuracies in call duration.

Consideration may need to be given to including a suitable definition of "Call Duration" into the relevant Published Tariffs. [*see Direction clause A3.5.4*]

As the nature of communications changes customer charges are more likely to be as a result of one or more discrete events, e.g a text message or a packet of data. Consideration needs to be given to quantifying these event elements, how they are measured and how inaccuracies can be introduced.

Data may also be charged by quantity (e.g. kilobytes) or be subject to a "fair usage" policy. In these cases it may be necessary to define how the quantity of data is calculated. For example, repeat transmissions may, or may not, be included in the calculation.

8.8 Measurement Systems

8.8.1 Introduction

Clause A3.4.6.1 of the Direction requires you to agree with us a Measurement Strategy document, *"the purpose of the strategy is to describe the measurements to be taken and supporting controls that the Communications Provider shall produce, and undertake, to demonstrate the performance of the Total Metering and Billing System, as described in 4.1* (A3.4.1 High Level Description) *and 4.2* (A3.4.2 Risk Management)*"*.

Measurement and monitoring is necessary to demonstrate conformity with the requirements of the Direction and to help avoid incidents which might compromise that conformity.

Implementation of the techniques described in this chapter has also been shown to benefit the revenue assurance process.

Because of differences between the metering and billing systems used by different Applicants, we do not seek to impose a particular measurement strategy on you; we will accept any that adequately demonstrates compliance with the requirements of the Direction and your particular situation. This section gives guidance on developing a strategy and implementing the corresponding measuring system, and on presenting the measured performance on a regular basis to us.

8.8.2 What needs to be measured?

8.8.2.1 Accuracy of Individual Charges

The Direction (clause A3.4.4.1) states that

"In order for End-Users to understand the charges on the Bill, the Tariffs and rules that determine Event charges shall be made readily available to those End-Users.

Tariffs shall specify the resolution, rounding, method and the units of measure applied to Events and charges, both at an individual and aggregate level";

This should ensure that the end user is charged correctly for all services which are within the scope of approval.

Some services may have been excluded from approval because they have not reached the revenue threshold. Performance requirements are specified in the Annexes[8] of the Direction.

The types of charges which need to be checked for accuracy include:

- Non-Usage Non-Recurring Events ~ "one-off charges" for the provision, modification or cessation of services (e.g. connection or installation fees, supply of equipment where title is transferred to the end user, bundles or package "add-ons");
- Non-Usage Recurring Events ~ recurring charges for the continuation of services (e.g. rentals and facility charges, bundles, discounts);
- Usage Events ~ usage charges for the services by duration (e.g. phone calls), quantity (e.g. megabytes of data) or count (e.g. SMS messages), or indeed by a combination of these;
- the correct application of VAT and other taxes where appropriate.

For post-pay (contract) customers, the accuracy of charges appearing on their bills against published or bespoke tariffs should be checked. For pre-pay customers, the equivalent process of decrementing of their accounts with usage and other charges (for example, the charging for content in text and other multimedia messages) and the recharging ("topping up") of the accounts will need to be checked.

Generally, any of the types of measure specified in section 8.8.6, can be used to measure the above. However, so far as network operators are concerned, measurement is usually only done by monitoring live traffic and/or signalling messages, or by the generation and monitoring of test traffic. Only these measures can check the accuracy of customers' usage and the accurate delivery of their records to the rating and billing system or to another CP.

8.8.2.2 Individual Bill Accuracy

The requirements of clause A3.4.8 of the Direction relate to network-wide performance standards; i.e. performance is measured across the whole customer base. In theory at least, it is possible for your entire error allowance to end up on a single customer's bill. To address this, clause A3.4.8.3 of the Direction requires you to have safeguards (i.e. controls) in place to prevent gross errors being included in individual customers' bills. Such controls could include the checking of a sample of bills before dispatch or the monitoring of customers' usage for significant deviations from the normal pattern. The latter control may already be in place as part of a fraud

[8] Annex B Fixed Publicly Available Telephony Services; Annex C Mobile Publicly Available Telephony Services; Annex D High Speed Internet (Broadband); Annex E VoIP, all access networks; Annex F Undercharging Detrimental to End-Users

management system to detect significant variations in customers' bills arising from fraudulent use[9].

The Direction does not define numerically what constitutes a "gross error", so we would look at the effectiveness of the controls which are in place to prevent errors occurring. For example, if a bill sampling control is in place:

- is the sample taken statistically significant?
- does it cover an adequate range of customer types?
- is the sample sufficiently random (i.e. not the same bills sampled every time)?

Account should be taken of the effects of skewing the samples to check for the introduction of novelties to the bills. The ISO 2859 series of standards provides useful guidance on sampling techniques.

8.8.2.3 Timeliness

The Direction [*clause A3.4.7.4*] has a requirement for the timeliness of post pay billing, and any charges which fail to be billed within the specified time are required to be written off. However, if a prevailing bespoke contract exists, it is permissible to specify in that contract the acceptable delay to Billing Events [*see Direction clause A3.4.7.4c)*]. If you are seeking approval under Annex F, Undercharging Detrimental to End-Users, provision for the number and value of such written-off charges should be included as under billing in the reported accuracy figures.

If more than one Organisation is involved in the operation of the TMBS then it will be necessary to apportion the timeliness allowance between them – see section 8.8.9 below.

8.8.2.4 Qualification Threshold

The Direction [*clauses A3.3.1 and A3.3.3*] sets out the criterion for products and services which need to be included in accuracy reporting. Any products and services meeting this criterion should be included in your measurement strategy. Services which do not meet the criterion may be included on a voluntary basis by agreement with us if, for example, separating these services out for measurement purposes would be impracticable. Periodic reviews of the strategy *(see section 8.8.3)* should assess whether the portfolio of products and services being measured includes all those which meet the criterion or whether there are some which need to be included or could be removed.

8.8.3 Developing a Measurement Strategy

Once you have identified through appraisal *(see section 8.7)* those elements of the TMBS contributing to metering and billing accuracy and have analysed where errors could occur within that system you are in a position to develop a measurement strategy.

The strategy should contain:

- a set of measures which will detect any such errors and quantify their impact
- a methodology for aggregating the individual measures to demonstrate whether you are meeting the performance requirements of appropriate Annex(es) of the Direction
- a means of reporting these performance measures on a monthly basis to us.

In order to meet the requirements of clause A3.4.6 of the Direction you will need to develop and agree with us the strategy that you propose to follow to provide a measurement system capable of demonstrating compliance with the requirements of the Direction. Within the strategy you need to:

- demonstrate that the strategy proposed will enable you to measure accurately the metering and billing performance of the TMBS;
- outline the individual measures which are in place or which you intend to implement;
- specify the programme for realising any measures not already in place;

[9] Fraud is outside the scope of the Direction but can give rise to significant numbers of customer complaints which will require investigation.

- indicate how the individual measures will be aggregated to demonstrate compliance with the performance requirements of the Direction;
- indicate how the measurement results will be presented to us to demonstrate how the TMBS performance compares with the numerical requirements of the appropriate Annex(es) of the Direction.

The measurement strategy may propose a single measure reflecting each aspect of overall performance (for example: metering, rating, rentals, other chargeable events) or, more likely, a combination of complementary measures. As far as possible, measurement systems should be independent of the TMBS; it is not wise to rely on a TMBS element self-reporting that it is performing accurately. Further details on the types of measure which could be considered for inclusion in the strategy are given in section 8.8.6.

You should provide in the measurement strategy an outline description of each individual measure and how it contributes to the overall strategy. Each description of a measure will analyse how the measure will quantify the impact of the potential sources of error identified in appraisal, and may refer out to more detailed descriptive documentation if necessary. It is helpful to show the measures on an overall TMBS diagram to identify which element(s) of the TMBS will be addressed by which measure(s). Such a diagram will readily indicate any gaps in measurement coverage and where allowances may have to be made for double-counting, i.e. where the same error could be picked up by more than one measure.

The target for the performance indicated by each measure in terms of its impact on metering and billing accuracy may need to be set more strictly than the requirements of the Direction, so that the aggregate of the measures serves to confirm compliance with the Direction. Aggregation is considered in more detail in section 8.8.7. You may also wish to set stricter accuracy levels to enable corrective action to be initiated before compliance with the Direction is in jeopardy.

If the requirements are to be met by more than one measure, you should describe how the different measures complement one another and how the results from individual measures are to be aggregated to provide a single overall measure of performance for each of the relevant measures within the Annex(es) of the Direction. The aggregation methodology should indicate what steps are taken to ensure that errors are being counted once but only once, as it is possible that the impact of an incident may be picked up at more than one measurement point.

You are encouraged to discuss and agree your strategy proposals with us at an early stage in the Certification process to enable effective performance measurement to be put in place as soon as possible. This is important since you will need to demonstrate a minimum period of compliance with the performance requirements of the Direction before Certification could be considered *(see section 8.8.5)*. Implementation of an agreed measurement strategy is therefore usually on the critical path towards approval.

A measurement strategy should not be considered to be unchanging. Changes to the TMBS or the introduction of new services may mean that new measures will need to be introduced or existing measures modified. The appraisal of any such TMBS change or service introduction should consider measurement requirements so that any necessary alterations can be made to the measurement system. The provision of data feeds from TMBS elements or processes to enable measurement of the new system or service to take place should also be considered at an early stage of the planning.

Experience with the operation of the measurement system and the reporting of its results may suggest more efficient or more accurate methods of measuring performance. Similarly, new audit tools or software may become available which could increase the accuracy and reduce the operating overheads of the system. All these factors indicate that the measurement strategy should be regularly reviewed and, if necessary, changes proposed to us. Such changes will normally be agreed provided we are satisfied that the strategy continues to be fully effective.

8.8.4 Implementation of the Measurement System

Having agreed the measurement strategy with us, you should now take steps to implement the corresponding measurement system. You should produce an implementation plan identifying the major milestones and target dates for those measures not already in place. We will review this plan regularly at progress meetings. Note that it is not necessary to wait until all measures are in

place before commencing performance measurement; it is preferable to start reporting the output from a measurement tool as soon as it is operational. It is also possible that part of the measurement system may predate the application for Certification. Provided that you can demonstrate that throughout this period the output conformed to that subsequently agreed with us and had been accurately reflecting the performance of the TMBS element being measured this output may be taken into consideration when Certification is being sought.

We are aware that some types of measurement tools (for example, a test call sending capability) are expensive and may take a considerable time to implement. This can cause budget issues within your organisation and could delay Certification. If such problems arise, you should discuss them at an early stage with us. It may be possible to suggest an alternative approach which would be acceptable in the short term, such as manual analysis rather than an automated tool, or to agree the phased implementation of a tool, for example to roll out a test call system to the busiest switches first. Putting the full solution in place would then typically become a Category 2 Corrective Action [*see Direction Annex A*] with agreed timescales.

8.8.5 Reporting

The Direction contains numerical performance requirements for accuracy and reliability of your TMBS. Once you have agreed a measurement strategy with us and have implemented it, performance reports should be produced monthly and presented to us. Performance against the Direction should be calculated both on a monthly basis and also over a rolling 12-month period. When considering whether you should be granted Certification (or the renewal of Certification), we will normally look at the cumulative mean of measurement results taken over a 12-month period in order to average out inevitable monthly fluctuations. However, if these fluctuations are significant further investigations into the reliability of the TMBS may be necessary. The relationship between you and us should ensure that the reasons for any such fluctuations are investigated on an ongoing basis, rather than creating a potential delay in granting or renewing Certification. Measurements taken over a period of less than 12 months (but not less than 6 months) may be acceptable for Certification purposes provided that we are satisfied that the TMBS is consistently performing well within the required standards and that all other requirements for Certification have been met.

After Certification has been granted, you should continue to provide us with performance information on a monthly basis. This will constitute part of the evidence required for continuation of Certification. At any time during the currency of your Certification, unsatisfactory performance figures could lead us to consider withdrawal or variation of your Certification. Treatment of specific incidents which might jeopardise your Approval is considered in more detail in section 8.8.10.

For continuation of Certification, we will normally consider the cumulative performance over the whole of the preceding 12 months, unless during that period there has been a significant change to the TMBS which would render these figures unrepresentative of the TMBS performance at the time of renewal. In this case, we may agree with you to consider the performance since the change as the principal input to renewal and use the performance over the remainder of the 12 month period as supporting evidence towards the granting or withholding of renewal. For example, a new billing system installed during the year may have a markedly better (or worse) reliability than its predecessor. Similarly, a major incident [*see Direction clause A3.4.7.3 - Extraordinary Performance Failure*] following which an effective correction action was put in place could also render the 12-month figures unrepresentative of the underlying TMBS performance.

8.8.6 Types of Measures

There are a number of different types of measures available to you which can be incorporated into a measurement strategy. These include, but are not limited to:

(a) **Monitoring of live traffic** by the use of call logging equipment (or SS7 probes – see (g) below) and a comparison between the theoretical charges and the charges recorded on the customer's bill. This has the advantage that measurements can be made on the basis of real traffic, in terms of destination, duration, time of day and any other factor on which charges depend. However, by its nature call logging equipment will be situated at a discrete number of locations in the network and so the performance measured in this way may not be representative of the network as a whole.

(b) **Generation of test traffic**, using test call senders and receivers. This provides a more controlled environment for measurement. The extent to which test traffic can be made to reflect real traffic is dependent on how much of the metering and billing system is covered by the call sender based measure, how the mix of test calls types matches the mix of calls in live traffic and what other measures are in place. As a minimum test calls are used to determine the accuracy and completeness of CDR generation at the switch and their transfer to mediation or rating, but they can also be used to check the accuracy of switch clocks, rating, billing, call bundling and the application of discounts. An end-to-end measure such as a test-call sender is also useful as a cross-check on the other measures, as a probe for investigating suspected problems or as a trigger to initiate investigative or corrective action. For small networks, the numbers of test calls required to be statistically significant if used as the only measure may be unrealistically high – there have been cases where the test call sender (if used in this way) would have been the largest customer. A better approach might be to use test call sending as one component only of the demonstration of compliance, supplementing the results with judiciously chosen measures from a variety of other sources.

(c) **Use of system controls**. Modern data processing systems generally have built-in controls to monitor system performance. The output of these controls can be used as a basis for a measure. As an example, file numbers can be used to monitor the contiguity of data flowing through the system. If a file is lost during any part of the data transfer the impact on accuracy can be estimated from knowledge of the average contents of such files. The use of controls offers an opportunity for you to detect and correct errors before the customer receives the bill. If the error is corrected before the bill is presented to the customer this does not count as an inaccuracy against the Direction.

(d) **Data validation packages**. The use of a standard test set of metering or other tariff data (sometimes known as a “Basket of Calls”), run through the rating/billing system(s) at regular intervals (e.g. daily, or before each rating or billing run) and after tariff changes will provide an early indication of tariff data errors. Should a charging error be found after bills have been sent to customers its impact on billing accuracy would then be calculated from knowledge of the length of time the error has been in place, the frequency with which that piece of data is exercised and the known profiles of use of the data.

(e) **Data reconciliation**. If similar data are available in more than one form or at different points in the TMBS then reconciliation of the data can be undertaken. Examples include (i) the financial reconciliations carried out in prepay systems to ensure that debits and credits are compatible, (ii) the matching of line rentals against generated CDRs to ensure that lines for which rentals are being charged are in use and being metered (and vice versa), (iii) the reconciliation of HLR and customer billing data in a mobile network or (iv) the comparison of the contents of rating tables against published tariffs.

(f) **Manual data checks**. In some circumstances it may be necessary to check data manually against a set of reference data, where the installation of an automated system may not be justified on cost grounds. An example would be the checking of little-used tariffs whose inclusion in an automated test routine would increase the running time of the tool unacceptably.

(g) **SS7 probes**. The use of probes which monitor the Signalling System no 7 (SS7) messages in your network can be used as an adjunct to, or possibly as a stand-alone replacement for, test call sending as they provide an independent method of verifying the parameters contained in CDRs. For example, if a test call CDR differs from the corresponding network-generated CDR the related SS7 messages could be used to help determine which is correct. However, SS7 analysis can be very complex in all but the simplest of networks because of the large numbers of messages generated and the fact that the SS7 messages may not be routed in the same way as the calls they relate to. You may already have SS7 probes in place for fraud monitoring purposes, so potentially these could also be utilised for measurement.

(h) **Write-offs and Customer Credits**. You may frequently have to write-off CDRs either because they don’t contain sufficient data to rate or allocate them correctly, or because they have become too old to bill [*see Direction section A3.4.7.4*]. These write-offs will be counted as under-billing if Annex F of the Direction is included within the scope of certification and you must have the capability to determine their number and value. Their value may have to be estimated from average call values if corrupt data prevents accurate rating. You should also be able to separate out records which are being written off for good-will reasons; for example, there may be a

company policy not to bill for late calls which nevertheless are still within the Direction's permitted billing window. Similarly, you must be able to separate out those credits given out to customers because of billing errors and those given for good-will reasons. The measure should capture both those credits given out directly as the result of customer complaint and those given to customers who may not have complained but who have been identified through a root cause analysis of the original complaint.

(i) **Sampling measures.** If you have a significant number of business customers who have bespoke tariffs it may be difficult to implement automated measures, especially if rates are determined on an individual basis rather than from a set of permitted discounts. Equally, a manual check of all such bills may not be practicable every billing period. In this case it could be acceptable to determine performance against the Direction by examining a sample of such bills each billing period such that over a determined period of time (e.g. a year) all customers have had at least one bill examined. If possible checks should be made as soon as possible after a customer has had a tariff or service change.

8.8.7 Dimensioning and Aggregation of Individual Measures

8.8.7.1 General

Your measurement strategy should provide a high level of confidence that the Direction is being met. The measures proposed should be supported by an analysis which confirms that each measure is dimensioned to deliver an acceptable degree of confidence and indicates how the measures will be aggregated to produce an overall measure to the required level of confidence. We will request you to provide the necessary supporting documentation to verify that this confidence is achievable in practice.

An example of dimensioning a measure would be determining how many calls per month a test call sender should send. If the performance was to be calculated from a statistical analysis of test call sending alone, smaller Applicants would have difficulty in demonstrating confidence because of the large number of test calls required, as the sample size required is effectively independent of network size. In these circumstances, additional measures are required to reduce the number of test calls required

The process of aggregation of the results can be designed only after the full range of measures in the measurement system has been determined. The process will consist of:

- the identification of the achievable results for each measure
- the interpretation of the results for each measure in terms of the Direction
- an apportionment, agreed with us, in respect of each measure in the measurement system after eliminating any double-counting so that the aggregate meets the Direction

It is preferable that the aggregation process is automated as far as possible, for example by use of a spreadsheet, to minimise the risk of transcription or calculation errors being introduced.

8.8.7.2 Aggregation of call and non-call events

The Ofcom Metering and Billing Direction 2003 included non-call chargeable events such as rentals and one-off charges as well as call charges and brought with it the need to aggregate the call event and various types of non-call event errors when determining whether the performance requirements of the Direction were being met.

This situation has been simplified to some degree with the introduction of the Ofcom Metering and Billing Scheme 2008. However, there remains a level of complexity; this aggregation is a difficult area which has caused Applicants much confusion, as effectively they are trying to aggregate event types which have very different characteristics. Aggregation will normally only be an issue when considering billing accuracy, as non-call events rarely impact metering.

8.8.8 Limitations and Systematic Errors

A particular measure may contain a limitation or a systematic error. For example, a test call sender is unlikely to record exactly the defined duration of the call. However, the tolerance may be stated by the manufacturer and there may be a consistent offset between the metered and

measured durations. You should identify the location and extent of all limitations and systematic errors. The information so gained may form an input to the analysis of the performance.

8.8.9 Interworking between Organisations

In some cases, the TMBS may be under the control of more than one Organisation [*see Direction clause A3.4.5*]. For example, a mobile Network CP may sell its services through an independent service provider, who may or may not re-price the CDRs from the Provider before billing the end user. The service provider will also be responsible for order taking and may or may not be able to activate customers directly on the network Provider's system. A further example would be a switchless reseller who sells service on another Provider's network and who outsources customer billing to yet another organisation.

In each case the Organisations will have to reach a contractual agreement as to how the overall services provided meet the requirements of the Direction. This has proved to be an area of difficulty in the past with reluctance by some CPs to commit contractually to an agreement.

If this situation cannot be resolved it will initially be escalated to the appropriate Approval Body (or Bodies) concerned and then, where Approval is relevant, ultimately to Ofcom.

Each Provider should be reported in such a way that it is possible to demonstrate that if each Provider's accuracy is within the agreed limit then the TMBS as a whole will meet the performance requirements of the Direction.

The Metering and Billing Approval Bodies Forum has been established to act as a forum to resolve issues between Applicants, other Organisations and their Approval Bodies and to resolve issues of interpretation of the Direction.

A website[10] has been established where members of industry may seek guidance on particular issues associated with the Direction. It is probable that case law will develop as the implementation of the Direction matures, this website will be used as the medium for disseminating that information.

8.8.10 Incidents and Extraordinary Performance Failure

Experience shows that significant breaches of the Direction may result from a single incident, such as the accidental disabling of CDR generation at the switch or the erroneous application of a tariff or discount. Even with relatively prompt corrective action, the impact on the relevant performance measure may be such that it will not return within standard for many months. During this period its effect could be to mask other smaller but still significant errors.

You should have adequate controls in place to minimise the risk of such incidents occurring. For example, you should implement monitoring to verify that:

- all functional units involved in the TMBS are effectively managed at all times so that any malfunction is quickly spotted;
- the implementation of any change to the TMBS or tariff structure is carried out under controlled conditions so that any problems encountered can be dealt with effectively;
- the correct tariff rate is applied at all times. If tariff discrepancies are identified, records should be kept of any corrective action taken to enable customers' bills to be rectified and any impact on accuracy to be calculated.

If an incident occurs which causes performance to exceed four times one or more of the accuracy limits within one month, this is an Extraordinary Performance Failure (EPF) [*see Direction clause A3.5.7*]. From the month within the measurement period when an EPF occurs until the end of the measurement period measurement data must be presented to TÜV SÜD BABT with the EPF included and the EPF excluded. This also applies to any subsequent EPFs. This will allow us to judge the underlying performance of the TMBS.

Each EPF will be raised as a Category 2 [*see Direction Annex A*] finding. Should more than 3 EPFs occur within a 12 month rolling period a full review by the Approval Body of the TMBS shall

[10] http://www.mababf.org/doku.php

take place to re-establish fitness for Certification. Failure to implement a Recovery Plan as stated OR to time will result in escalation of the finding to a Category 1. Where Approval is relevant, Approval Bodies are required to report Category 1 findings to Ofcom.

8.9 Process Management

8.9.1 Introduction

Clause A3.4.3 of the Direction requires that a Communications Provider (CP):

"shall have and enforce the effective use of procedures and/or documentation covering all aspects of Total Metering and Billing System.

All business and technical processes that can impact the Total Metering and Billing System shall be included within the scope of a process management system for approval purposes, including those related to third parties or sub-contractors."

This section gives guidance on how you can demonstrate that you have implemented a Process Management System (PMS) that meets the requirements of the Direction.

There is no requirement for your PMS to be certified [*see Direction clause A3.5.3*], however if you hold accredited certification to ISO9001: 2008 (or ISO9001: 2000 until November 2010) with an appropriate scope this will be taken into account when we are auditing compliance *(see section 8.9.4)*.

8.9.2 Process Management System Guidance

In our experience this can best be demonstrated by addressing the following:

You should establish, document, implement and maintain an effective Process Management System (PMS) that addresses as a minimum the points in Table 1 at the end of this document.

All processes and procedures that can have any effect on the performance of the TMBS should be encompassed within the scope of the PMS for certification purposes. For examples see section 8.7.3.

For the purposes of certification, the "product" should be interpreted as the bill received by your customer or service usage information that you supply to a service provider (or equivalent). In the case of pre-pay services, it is the accurate credit and debit of the customer's account.

You should define within the PMS the procedures and controls operated for each component of your TMBS such that the latter may be effectively audited.

The appraisal process described in section 8.7.3 will have identified the key features of your TMBS. It will also have identified the associated human processes. We would expect your PMS to be structured to permit effective surveillance of the TMBS. In particular, we would expect to see an overall control function covering the metering and billing process (not just the billing "pipeline") to collate all customer complaints related to, and incidents affecting, metering and billing accuracy. This function should report such complaints and incidents centrally and also to customer support teams so that they can service billing enquiries.

The internal audit regime and audit programme should encompass the totality of the metering and billing process. he programme should include headquarters operations and external support units, such as marketing and sales (including retail outlets which are operating units of a CP). Consideration should be given to the relative importance of each unit *(see 8.7.2.5)*.

There should be sufficient documentation of the organisation, key procedures, ancillary activity and support tools to avoid the establishment of processes that depend for their effectiveness on local knowledge. This weakness becomes all too apparent when the persons concerned are unavailable.

8.9.3 Demonstration of Compliance prior to Meter Approval

The amount of work to demonstrate compliance with the Direction, and the degree of our involvement, depends on the state of the existing process and/or quality management systems.

At one extreme, you may not initially have established a formal PMS system. This does not necessarily indicate a malfunctioning TMBS. However, to continue to ensure consistent

operation, repeatability and measurability, we will encourage you to build up a PMS system compliant with the Direction. We will undertake audits of the evolving PMS system to monitor progress and decide when compliance has been achieved.

There are many variations between the case described above and a PMS already fully compliant with the Direction. We will take account of existing evidence, such as internal or external quality or financial audit reports, which cover one or more aspects of the TMBS.

8.9.4 Exemptions

You may claim qualified exemption from the procedure described in section 8.9.3 by showing to us a current certificate of compliance with ISO 9001: 2008 (or ISO9001: 2000 until Nov 2010) issued by an accredited certification/registrar body.

We will examine in an audit the scope of the certification and other evidence that you submit to confirm that it entirely covers your part of the overall TMBS. Where we find gaps in the scope and coverage, we may undertake additional quality audits to complete the coverage.

8.9.5 Continuing Compliance

We will undertake audits as necessary to show that the PMS is being maintained in compliance with the Direction. Where you have claimed an exemption *(see section 8.9.4),* we will need to be satisfied that it remains valid. Where we have doubts, through appraisal *(see section 8.7.4),* or audit, as to the effectiveness of the PMS, we reserve the right to undertake further audits irrespective of the status of the QMS certification.

8.9.6 Changes to the PMS

Changes to the PMS should be notified to TÜV SÜD BABT in the same way as other changes to the TMBS *(see 8.10)*. Irrespective of any exemptions claimed, we will wish to satisfy ourselves that the scope of the revised PMS still covers the entire TMBS effectively. Likewise, changes to the TMBS itself will be assessed to confirm that the PMS remains effective.

8.10 Change Management

8.10.1 Introduction

Change management is a critical part of Certification (and Approval). An initially well designed and implemented system can become inaccurate if poorly controlled changes are made. Each component of the TMBS *(see section 8.2)* usually comprises some hardware, some software and some human procedures. Different criteria may apply to changes in each of these areas.

Hardware and software changes are usually designed by the manufacturer. Some are a direct response to a request from the Applicant. Some may be related to demands made by the world market, the need for cost reduction or the replacement of components that are becoming obsolete. Others are made to fix problems. Software may be modified at planned intervals or patches issued to solve urgent problems. Human processes may be changed to make use of newly available technology, to simplify tasks or as a result of reorganisation. Few of these exercises are intentionally related to metering and billing accuracy.

However, experience indicates that unexpected effects can easily occur when changes are made, some of which will impact on accuracy. As an example, a change to management reports has been known to cause the storage of large numbers of small files on hard disks. Such files may compete with charging data for storage and directory space. Apparently innocuous changes have thereby caused significant loss of charging data.

Tariff and numbering changes, if the associated data fill exercises are incomplete or incorrect, can give rise to incidents involving un-billable call records. Sometimes the number of records in suspense can overwhelm the resources allocated to rectification of such problems.

Sometimes individual changes are tested in isolation. Problems may arise if they are implemented simultaneously. Also, for example, if a new service is provided with an initial period of tariff reduction set for removal at a later date, an intervening modification could disable the trigger for reverting to the normal tariff.

Experience shows that many incidents leading to non-compliance with the Direction arise from implementation of changes considered not to affect the TMBS, or the improper implementation of

changes that do. This section describes what we have found to be best practice to minimise such incidents.

8.10.2 Appraisal of Changes

Clause A3.5.3 states:

"Once Approval has been granted, the Communications Provider is required to maintain its Approval. This is achieved through the on-going audit and surveillance of the Total Metering and Billing System by the Approval Body.

Changes to the Total Metering and Billing System continue to be assessed through the review of appraisals of the key parts of the system."

As stated in section 8.7, the TMBS will change with time. These changes will need to be appraised as well.

To prevent the degradation of accuracy, all changes to products, services, tariffs, terms and conditions, advertising campaigns need to be controlled. You should appraise all changes to equipment, data, processes and procedures in areas relevant to the TMBS prior to their implementation. The appraisal needs to consider the potential of each change to cause a breach of the requirements of the Direction.

Appraisal *(as defined in section 8.7)* of changes is a high priority activity. It needs to include a critical review of the intended features of a change, and the application of experience and / or brainstorming to interpret the possible unexpected effects. Provocative testing in these areas will be of value, as will the application of standard test patterns, such as a set of test calls to a switch, or a file of known charging data to a mediation, rating, or billing system *(see section 8.10.4).*

The relevant areas will be those that have been defined as part of the self-appraisal process *(see section 8.7.3)*.

Situations can arise when changes to the operator's organisation are made that result in the non-performance of an activity essential to metering and billing accuracy. Allied to such changes is the need for clear definitions of responsibilities to initiate and sanction changes. All managers responsible for equipment, data or procedures forming part of the TMBS should therefore have defined their authority to change them. Any reorganisation impacting on responsibilities for metering and billing should be implemented only after any necessary, consequential reallocation of such responsibilities has been fully defined, and at the same time as those responsibilities are reallocated.

8.10.3 Management of Changes

It will be necessary to manage the change process so as to avoid the inadvertent introduction of modifications that have not been subjected to appraisal. You may already have a change control regime which requires sign-off from all affected departments. However, experience shows that even well-controlled change management can occasionally permit modifications that inadvertently cause a breach of the requirements of the Direction.

In our experience, achievement of Certification (and Approval), and its subsequent maintenance, is accompanied by a growing level of knowledge and experience of what gives rise to metering and billing errors. This should be harnessed to the change management process and those having the knowledge and expertise should be included in the authorisation of changes. However, the change control process should have clearly identified ownership, ideally controlled by a single manager. Regular review of the success or otherwise of implemented changes may point to ways of improving change management. In assessing compliance with clause A3.5.3 of the Direction, we will investigate the effectiveness of your change control regime.

It is unlikely that any single person within your organisation will have the expertise to appraise all proposed changes. You should therefore identify people with appropriate technical knowledge in each area and train them in appraisal techniques. They would also need to be conversant with the requirements of this scheme and the Direction. We would need to be satisfied that such people have the relevant experience and training.

You are not restricted in the implementation of any organisational hierarchy to achieve effective appraisal and review. For example, a range of internal appointments could be made each of

which might be associated with a component of the TMBS. However, the requirements of clause 8.2.2 of ISO 9001:2008 regarding the independence of the personnel doing this work need to be considered *(see section 8.7.3.2)*. The size of the hierarchy should be commensurate with that of your organisation.

We would expect the appraisal regime to be sufficiently flexible so that most doubtful changes would be trapped and amended before reaching the stage whereby rejection might become embarrassing. A two-stage process could be introduced whereby provisional acceptance could be given, the final approval being subject to the outcome of a limited field trial or testing on a separate, dedicated test-bed.

8.10.4 Testing Proposed Changes

We strongly recommend that all changes should be subject to a verification programme of provocative testing prior to their introduction onto the Applicant's system. This could be undertaken by you either on a dedicated test bed or on a trial site on your live network. Alternatively, the evidence may be obtained from the equipment supplier or another Organisation *(see section 8.10.5)*. Where you intend to rely on evidence of satisfactory testing from the supplier or another CP, or from your own test-bed, you should confirm that the conditions of test are relevant to the network for which you are responsible.

Experience suggests that it is not sufficient just to test whether the intended change has been successfully implemented. To maximise the chances of trapping undesired side-effects, a suitably comprehensive test programme, as judged by the person(s) responsible for change management, should be prepared to replicate all the various conditions that are found in practice in the your TMBS. Each proposed change should then be subject to the test programme. Since any practicable test programme cannot guarantee to trap all errors, it should be kept under review and updated as necessary to incorporate tests for errors found or contemplated since the previous update. You should confirm that there are adequate resources to carry out testing and verification.

Bearing in mind the principles of clause 8.2.2 of ISO 9001:2008 *(see section 8.7.3.2)*; the test programme should be designed by a person other than the designer of the TMBS component.

If a trial on the live network is contemplated, it should be remembered that the provisions of the Direction still apply and errors on customers' bills will count against it. This can be mitigated by giving prior warning to potentially affected customers of the possibility of such errors and how they will be rectified. Even so, you are recommended to limit the extent of the trial to avoid a breach of the Direction in the event of an unwanted side effect.

8.10.5 Suppliers

An Applicant is reliant to some extent on his suppliers of equipment and software. Clause A3.4.5 *(also see clause A3.4.1)* of the Direction requires you to contractually commit certain suppliers to operate and/or maintain relevant equipment so as to maintain compliance with the Direction. You should also place reasonable obligations on such suppliers to advise you of all changes to their product which might affect the TMBS for agreement prior to implementation. Such obligations should be sufficient to enable you to meet all the requirements of the Direction.

You may require evidence of satisfactory testing before accepting the change *(see 87.10.4)*.

8.10.6 Notification of Changes to TÜV SÜD BABT

The section applies to all those changes to equipment, procedures and organisation in areas relevant to the TMBS which are found, through self-appraisal, to have the potential to cause a breach of the Direction.

If you wish to implement a major change to the structure of the TMBS which would affect the wording of the Approval document, you should notify us according to section 4.3. Sufficient detail should be given to allow us to understand in broad terms the consequences of the proposed change and its relationship to other changes. There is usually a significant lead time between proposal and implementation of changes. Notification can then be given to the TÜV SÜD BABT Prime Contact at a regular, minuted, progress meeting. Otherwise, it can be done by letter, fax or e-mail. We will acknowledge these notifications.

Table 1 Guidance for an effective Process Management System

Related Clause in ISO9001: 2008	Guidance
4.2.4 – Control of records	You should agree with us the records that constitute quality records for the purposes of Meter and Billing Certification (and Approval) and make them available to us for an agreed period after generation. The "agreed" period will not exceed 15 months[11]. In some circumstances the retention of too much detail for this period may militate against effective data mining to retrieve a required item. Discussion will be necessary to ensure this requirement is applied in a way that achieves the desired purpose of traceability.
5.1 – Management commitment	The level of "Top Management" from which we will seek commitment will be such as to have executive control over the entire TMBS. For example, for a CP of a telecommunications network who bills end-users of his network, commitment will be sought from the manager with responsibility covering both the switching and the billing systems. This could be the senior manager appointed to manage Certification (and Approval)
5.3 – Quality policy	The quality policy should include a commitment to the quality of metering and billing.
5.4.1 – Quality objectives	Quality objectives should include those to ensure compliance with the Direction.
5.4.2 b) – Quality management system planning	*See section 8.7.3*
5.5.1 – Responsibility and authority	*See section 8.7.3*
5.6 – Management review	You should undertake a review of that part of your PMS/QMS covering the TMBS at least annually, starting from an agreed date and the record of each review copied to us. Typically, the agreed date will be the date of initial application for TÜV SÜD BABT Metering and Billing Approval.
6 – Resource Management	You should provide adequate resources for verification of any changes to the PMS.
7.3 – Design and development	Design and development validation should include a demonstration that any specified requirements arising from, or relating to, the Direction and/or this document are met. The requirements for changes to both the TMBS and the PMS (*see section 8.9.6)* are given in section 8.10.
7.4.2 – Purchasing information	If it has been established through appraisal that certain deliverables, of whatever sort, from any of your suppliers can impact upon compliance of your TMBS with the Direction, you should impose requirements on the supplier: (i) for him to implement a PMS or QMS to your satisfaction; and (ii) for you to have the right to regularly review your supplier's PMS/QMS for effectiveness. Should we reasonably request so in connection with a witnessed audit, you should endeavour to arrange for us to attend a PMS/QMS review at your supplier's premises.

[11] Corresponding to clause 11.2 of the General Conditions. Non-UK clients may be subject to different rules under their local jurisdiction.

Related Clause in ISO9001: 2008	Guidance
7.4.3 – Verification of purchased product	You should require your supplier to afford you the right to verify at source that purchased product conforms to specified requirements. Should we reasonably request you to exercise this right in connection with a witnessed audit, you should endeavour to arrange for us to attend you in exercising this right.
7.5.1 – Control of Production and Service Provision	All procedures, which through appraisal are established to be critical to the accuracy of metering and billing, should be subject to controlled conditions.
7.5.2 – Validation of processes for production and service provision	*See section 8.10*
7.5.3 – Identification and traceability	You should ensure that all documents and data relating to equipment are traceable to the build level of that equipment. You should retain records of metering for individual customers for a period acceptable to us (not exceeding 15 months[12]), and which is consistent with any statutory requirements. You should maintain adequate traceability between entries on a bill and the source data from which those entries were generated. In this context "source" refers to a practical point of non-transient storage.
7.6 – Control of monitoring and measuring devices	Examples of such devices include test call generators which will need to be calibrated for clock accuracy and call duration accuracy.
8.2 1 – Customer satisfaction	Your attention is drawn to clause A3.4.8.2 of the Direction.
8.2.2 – Internal audit	The audit programme should be reviewed at least annually and be agreed with us. You should ensure that the audit programme covers individually the management unit associated with each component of the TMBS. See also section 8.7.3.2.
8.3 – Control of non-conforming product	You should define, document and regularly review the interpretation to be placed upon "non-conforming product" and ensure that procedures exist within the PMS to deal with each type. An example of non-conforming product for the purposes of this clause would be Call Detail Records that are rejected by a pricing engine or billing system because of some error or omission in their contents. Similarly, requests to a switch to carry out a service provision may be rejected if the details do not conform in some way to the expectations. You should have defined procedures to handle such events and also to estimate their effect upon overall accuracy (See section 8.8).
8.4 – Analysis of data	*See section 8.8*.
8.5 2 – Corrective action	Your attention is drawn to clause A3.4.8.2 of the Direction.
8.5.3 – Preventive action	To determine potential nonconformities, you should establish and maintain a process of trend analysis of errors and customer complaints relating to accuracy of the TMBS.

[12] Corresponding to clause 11.2 of the General Conditions. Non-UK clients may be subject to different rules under their local jurisdiction.

9 Annex A: Reporting of Technical Audits

TÜV SÜD BABT will produce a report of each technical audit, recording the findings and conclusions. Where a weakness in the TMBS is found, it will be recorded as one of the following:

a) a *non-compliance*: This is used where a specific requirement has not been met. An example might be where a measurement result was numerically unacceptable. A non-compliance will identify the requirement breached.

b) a *deficiency*: This is used if some aspect is not satisfactory, and may place compliance with a requirement in jeopardy, without actually representing a breach of one specific requirement. An example might be where there is a lack of an appropriate procedure to handle an eventuality which is probable, but may not have yet occurred.

c) an *observation*: This term is used for less serious matters, which are nevertheless worth taking into consideration. It can also be used to record a strength.

A non-compliance or deficiency will be given an industry-standard category indicating the importance attached to its correction as defined in Annex A (Definitions and Interpretations) to the Ofcom Metering & Billing Direction, 2008f

The report will also contain an overall opinion upon the audit, which will be expressed in one of the following ways:

GOOD: A standard of control fully in accordance with that expected for the task in hand. This opinion will be recorded where there are few if any weaknesses present. The report will not contain any Category 1 or 2 items.

SATISFACTORY: The control objectives are met, but there may be minor shortcomings. There are no major weaknesses; however, there is room for some improvement. Typically there are one or more non-compliances or deficiencies and/or a substantial number of observations present. Nevertheless, there are no serious failures in any area. The report will not contain any Category 1 or 2 items.

SATISFACTORY EXCEPT: Most areas of control are up to the standards required for "satisfactory" or "good", but one or more areas display significant weaknesses. Alternatively, the general standards of control are indifferent, but there are no specific areas where control is particularly bad.

UNSATISFACTORY: Significant weaknesses exist in a number of the areas reviewed, and/or general standards of control are poor.

CRITICAL: There is a breakdown of control, leading to little or no assurance that the area being reviewed is functioning in the required way. The integrity of parts of the meter system is at risk. This opinion will be recorded where there are widespread breakdowns in controls, and/or the consequences of the weaknesses found could be severe in terms of metering and billing accuracy. An "Unsatisfactory" finding can turn into a "Critical" opinion simply because of the potential effects of the problems identified.

These opinions may be supplemented by comments on the management response from the unit audited. This will be of particular importance where the response reflects disagreement with the audit findings. However, they will not be taken into account when undertaking Results Assessment prior to issuing a Certificate.