

**Management services provided by
Public Network Operators (PNOs) or service providers;
Review of user needs for standardization;
Tutorial and recommendations**



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Foreword

This Technical Report (TR) has been produced by ETSI User Group (USER).

The present document corresponds to TR 101 672-1 as it has been decided not to create part 2.

The ETSI-UG has met three times on this topic, with in the meantime electronic document discussion, and the present document reflects the views of the working group. Comments have been obtained from many associations, operator's fora and ETSI-UG members.

The present document could have been limited to formulating questions without taking into account acceptable existing solutions. This would have lengthened the process of arriving at practical solutions, which are very urgent from a user's point of view. Therefore provocative statements have been taken and final solutions have been anticipated. The purpose of the present document is to draw users and operators attention on that topic and to obtain a consensus of opinion.

ETSI has initiated a research amongst European users into standardization issues and concerns. The present document has taken into account the main results related to the issue of Management Services provided by PNOs or Service providers, e.g. management services enabling the users to manage the networks and services provided by PNOs or Service providers.

General scope of TNM

Telecom Network Management covers the following topics:

- Performance & Quality of service monitoring;
- Alarms & fault reporting;
- Faults management;
- Cost information;
- Configuration.

Framework of the project

Although the survey has shown that users are interested in all the above topics, it is proposed to instigate an initial phase into the limited topic of Electronic billing since it is an urgent requirement for large corporations and enough material is available. The remainder of the project, Phase 2, will be carried out later on.

Scope of Phase 1

This phase gives guidance on:

- how the users are expected to manage the information, mainly Call Detailed Records (CDR's) and aggregated records, contained in bills provided by PNOs or service providers for applications beyond the standard charging-payment process, on how this information should be modelled and presented and what are the tools needed for managing this information.
- how the users are expecting Quality of service reports to be structured and presented.

Phase 1 covers the topics:

- Performance & Quality of service monitoring;
- Cost information,

out of the general range of TNM topics.

Scope of Phase 2

This phase will cover the other issues generally included in the Telecom Management.

In particular, Phase 2 will cover the topics:

- Alarms & fault reporting;
- Faults management;
- Configuration.

Introduction to Phase 1

From the user's point of view, a century of monopolistic provision of telecommunications services has inhibited, the normal procurement capabilities. Business globalization and the change to a more competitive environment, new entrants and alternative technologies: Fixed/Mobiles, Internet/Intranet, etc. now in use in all European companies place the topic of Network management in a totally new situation. Users now want to understand, compare, benchmark, monitor and change contracts if proven inefficient, at local, national, European and world-wide level. The development of Pan-European VPN's and global outsourcing has triggered the needs for international settlements and the corresponding management unified and standardized tools. This is true for both private networks and public networks. Since "historical" PNOs are still providing the majority of the Telecom services, it is of utmost importance to analyse, all over Europe, the billing and traffic information they are at present providing to their customers. The harmonization of presentation of management information to the users is becoming crucial. Otherwise, competition and new offers will remain in the hands of operators, which if true would be detrimental to users.

In the mobile/wireless residential market, operators are facing impulsive "churn" behaviour. This is a new phenomenon, which the PNOs have never before faced. Nevertheless, even this wild behaviour is competition and allows freedom of choice between provider. PNOs are afraid of the possible extension of "churn" to the traditional fixed telephony market and the professional sector. Therefore, in the short term, they might be reluctant to provide users with the necessary billing and traffic information. Refusal and unwillingness to provide users with standardized E-bills would certainly be considered as anti-competitive behaviours by the regulators. Since multi-provider situations are now unavoidable, this reluctance could cause users to turn to providers more willing to cooperate. Quality PNOs should benefit from providing E-bills to users: users will gain maturity and this may change their attitude towards making a rational choice of quality operators rather than impulsive "churn".

1 Scope

The present document aims to identify the user's needs regarding the management of networks and services provided by the PNOs or Service providers, how this information should be presented and what are the tools needed for managing this information properly. At the same time relevant information is provided to the users as a guidance.

As usual interest and requirements in this area may differ strongly depending upon the category of user. It is clear that the business users are the most interested in this issue but, with the development of competition, other categories of users should also adopt at least some of these requirements in the near future.

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETR 138: "Network Aspects (NA); Quality of service indicators for Open Network Provision (ONP) of voice telephony and Integrated Services Digital Network (ISDN)".
- [2] ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
- [3] ITU-T Recommendation X.400: "Message handling system and service overview".

3 Symbols and abbreviations

ANALYSIS, BELGACOM, BT, COMPASS, CONCERT, DEUTSCHE TELEKOM, GARDNER GROUP GLOBAL ONE, MATAV, OFTEL, OVUM, POLISH TELECOM, TELECOM ITALIA, TELENOR and UNISOURCE are brand marks.

WINDOWS is a trade mark of Microsoft Corporation.

LINUX/UNIX = PC operating systems.

3.1 Symbols

For the purposes of the present document, the following symbols apply:

APERAKS	UN EDIFACT Message
COMDIS	UN EDIFACT Message
CHGORDRES	UN EDIFACT Message
CREADV	UN EDIFACT Message
DEBADV	UN EDIFACT Message
INVOIC	UN EDIFACT "Invoice" Message
ORDERS	UN EDIFACT "Order" Message
ORDDER RESPONS	UN EDIFACT Message
PRICAT	UN EDIFACT "Prices/Sales Catalogue" Message
PAYORD	UN EDIFACT Message
REMADV	UN EDIFACT Message

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ANEC	European association for the co-ordination of consumer representation in standardization
API	Application Programming Interface
CDR	Call Details Record
CENTREX	CENTRAL EXchange
CPE	Customer Premise Equipment
CRD	Call Record Detail
E-billing	Electronic Billing
E-commerce	Electronic commerce
EDI	Electronic Data Interchange.
EDIFACT	EDI Facture
ETIS	European Telecommunication Informatics Services
ETNO	European Telecommunications Telecom Operators
EU	European Union
EVUA	European VPN Users Association
FMC	Fixed and Mobile convergence
FTP	File Transfer Protocol
ICT	Information Communication Technology
ISDN	Integrated Services Digital Network
IT&T	Information Technology and Telecommunications
LAN	Local Area Network
MOU	Memorandum of Understanding
NRA	National Regulatory Agency
PBX	Private Branch Exchange
PC	Personal Computer
PNO	Public Network Operator
QoS	Quality of Service
RFP	Request for Proposal
SME	Small and Medium Enterprises
SOHO	Small Office, Home Office
TELCO	Telecommunication Operator
TMA	Telecom Manager Association (UK)
TNM	Telecommunications Network Management
TCP/IP	Transaction Control Protocol / Internet Protocol
UMTS	Universal Mobile Telecommunications System
VHE	Virtual Home Environment
VPN	Virtual Private Network
W3C	World-wide Web Consortium
XML	eXtended Markup Language

4 Distinct Categories of Users

"User" is a word very often used in the standardization area but with various possible meanings. It can be understood as "user of standard" or "user of products/services" possibly conforming to one or several standards. This report is focused on the latter category of users.

Nevertheless, in this area "users of products/services" both end-users and intermediate service providers/resellers themselves may have different concerns depending whether they are:

- Consumers (e.g. residential users). The consumer is a single person or group of persons using services, products and/or systems for purposes that are outside his/her trade, business or profession. The consumer is the end user and usually the one paying for those services/products or systems. Consumers are not homogeneous and have a wide variety of needs, abilities and requirements in using services/products and systems. Education, gender, cultural and ethnic background can influence their way of handling and operating. Industry has then to take these different characteristics into account for the design of services/products and systems, especially when designing user manuals, which should not be restricted to purely technical information. It is generally believed that management services, especially E-billing will become more and more important to consumers (A recent market survey from Deutsche TELEKOM among German customers having access to a PC confirms that up to 60 % of residential users would accept E-billing). Traffic information and itemized charging are equally important to consumers. It can be further useful and important to monitor access of children to possibly indecent and harmful services.
- Teleworkers, Homeworkers.
- SOHO's (Small Office-Home Offices) developing as independent professionals or teleworkers.
- SME's entering Customers VPN's/Intranet's as members of virtual enterprises.
- Business users taking into account that they can be in their office or outside their office including their own household.
- IT&T managers, e.g. those responsible for IT&T services and the Management Information System inside the corporation.
- Managers of companies using ICT as a means to gain competitive advantages.
- Accounting managers EDIFACT oriented.
- Affiliated company from a large corporation in charge of global interface to providers and service provisioning to the entities of the corporation.
- IT Corporations having outsourced CPE's and traffic.
- New entrants in the Telecom business interconnected to the network of incumbent operators and billed according to interconnection fee agreements.
- Mobile service resellers who charge independently the end users while charged themselves by Fixed and Mobile operators.

In addition, the business needs may be very different with respect to the size of the company and to the sector where the business is performed. In Germany, the E-bill acceptance increases from 57 % with companies having between 1 and 9 employees, to 95 % with companies having more than 500 employees. Even if a direct involvement of SME's, SOHO's and consumers is highly desirable, experience has shown that this is not likely to occur. At the present point in time, big companies are more aware and mature about this problem than small ones and residential users. As ANEC emphasizes, residential users, SOHO's and SME's are not yet concerned by TNM but will be in the long run. The present document has placed most emphasis on big accounts and limited its scope of users, due to the lack of input from other types of users.

5 Users' needs

A survey was carried out among telecoms managers with 25 % of interviewees from SME via 100 telephone and 24 face to face interviews among 5 European countries:

- France;
- Germany;
- Italy;
- Sweden;
- UK.

The classification by nature of business was the following:

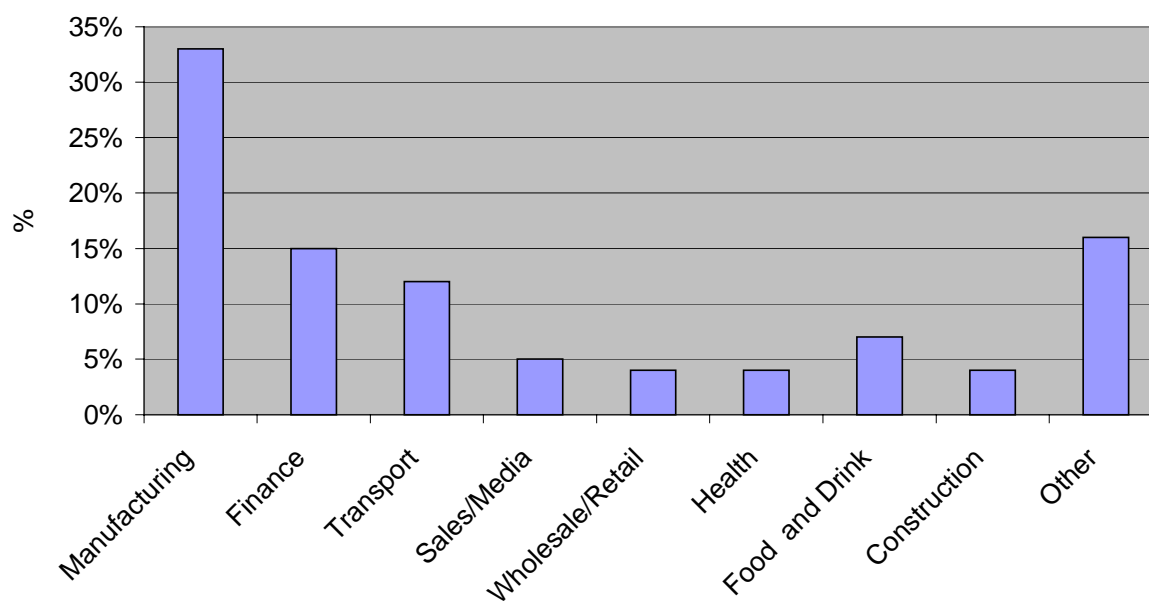


Figure 1

The survey is showing that the available tools allow the following aspects of service to be monitored:

	Performance	Quality
Network reliability	50 %	55 %
Alarms	40 %	50 %
Fault management	60 %	50 %
Cost information	40 %	30 %

30 % of the interviewees only are satisfied with the current management information, most concerns are:

- "too complex to compare" (40 %);
- "format too different to make a comparison" (25 %);
- "too little information" (20 %);
- "not the right information" (15 %).

85 % think that a standardized electronic comparison tool would improve their negotiating position.

If users and operators have of course the most important role to play in this area, 60 % of the interviewees thought that standardization bodies also have a key role in this scene.

Half sample only is happy with the billing station provided by the operators.

85 % wish to see interface standards developed to allow communication with their account systems and require a formalized pan-European method for comparing network and tariff information.

These results show clearly that there is a growing concern among the users about the management information to be provided by their suppliers and that a standardization effort is required.

5.1 Possible utilization of charging and traffic information

Companies can use charging information for a number of different purposes:

5.1.1 Managing the network

To ensure that the network configuration is at its optimum performance.

The Call Details Record (CDR) provided by some network providers, is of utmost importance to Telecom managers and strategy planners in order to manage budgets, make model simulations and forecast future expenditures and formulate budgets. It is therefore imperative that these records are standardized and the same information in the same format is provided by all different service providers. This application is of interest to management reporting inside corporations.

5.1.2 Monitoring & Control

Benchmarking of ongoing contracts, private networks versus public networks and the products and services of competitors, new entrants, VPN's, outsourcers, etc. is of special interest to companies as the telecommunications markets become more competitive. An everyday concern in many companies is to carry out comparisons of one provider's services and charges against another to determine the potential benefits and also ensure that previously agreed contracts are still competitive. This application is of interest to Telecom departments and purchasing departments inside corporations.

5.1.3 Charge back to departments

This is general practice in voice telephony where the data is collected from the PBX's and passed to the accounts department. The new requirement is now to extend this common practice to VPN's, customer-taylored negotiated contracts or outsourced telecommunications services world-wide. A special burden to companies are the different discounts, flat rates and bonus/malus mechanisms which make it difficult to breakdown corporate bills to distinct locations or departments. This application is of interest to Telecom managers inside corporations. Accounting and payment.

5.1.4 Accounting & payment

Most European PNOs, over the past 10 years; have experienced EDIFACT formats with little success. Less than 1 % of their bills are provided in EDIFACT formats and they still have to provide paper bills in parallel. The initial intention of PNO's was a complete set of messages spanning from invoice to electronic payment. This ultimate goal of operators has never been reached so far, mainly because of fiscal barriers.

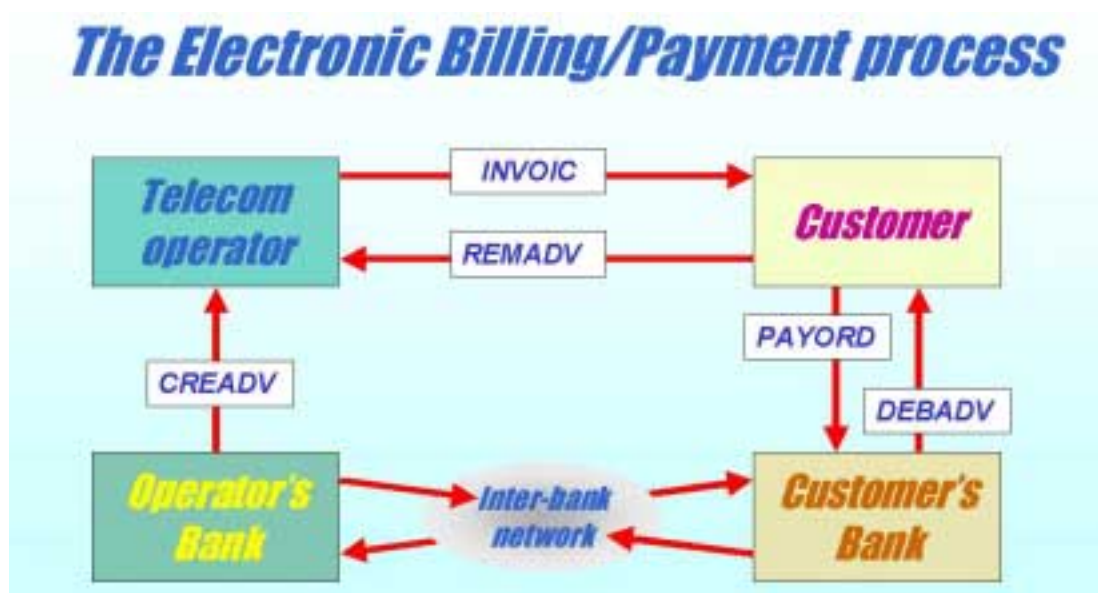


Figure 2: The Electronic Billing/Payment process

There are still legal issues, which impede the development of electronic accounting and payment. National ministries of finance are so far not ready to accept European regulations despite emergence of the Euro. Ministries of Finance never accepted complete de-materialization for fiscal verification purposes. Further, few accounting departments have so far moved their accounting software and practice to EDI because there are as many INVOIC messages as sectors of activity: automotive, telecom, food distribution, transport, etc. Moreover, national European trans-sectorial messages should be preferred to a telecommunications-specific message. E-commerce addressed by the European commission will open this topic, especially via new W3C promoted XML formats. The impetus of E-commerce should be used as a possible basis for Telecom billing development beyond the initial EDIFACT based achievements.

The currency of the payment should be decided by the user. The advent of the Euro will simplify matters within the EU.

Thus, the potential uses of Telecom electronic bill inside companies cover accounting, finance and strategic planning departments. The last two could be interested by EDIFACT, Lite-EDI/XML formats. The other user applications would be best served with relational database, data warehousing formats in order to link gathered information with the corporate and the management information system: organization, perimeter, activity and manpower, with price catalogues, with internal directories, etc.

In this picture of potential uses of PNO bills, there is a great need for standardization of the electronic provisioning (content, code listing for delivered services and format), at the users interface, so that bills from different providers may be managed and compared automatically. This will also allow for comparison of different offerings from one or several potential suppliers to be compared.

The ultimate objective of PNOs is clearly to achieve direct bank account payment. Few companies are prepared to accept this. Fiscal barriers prevent full development. Payment is certainly not the killer application for E-bills. Users are much more concerned with fast-track benchmarking, rapid Request for Proposal (RFP) build-up and ongoing contracts monitoring and control, as described in subclauses 5.1.1, 5.1.2 and 5.1.3. This difference of point of view between operators and users requirements has to be taken into account properly.

Because of their force on the market, existing and long standing PNOs views and concerns have to be taken into consideration because they could represent models to be followed by new entrants.

Arriving to an MOU reflecting users' requirements compared with, at the least, those of incumbent operators, at ETSI and ETNO level, is therefore an important target for users.

5.2 Needs for standards in the area of management of telecommunications charges, costs and billing

Taking into account the indication given above, to-day, users' are, first of all concerned with the charges, costs and billing of services provided by the PNOs. The main requirements are the following:

- As telecommunications becomes strategic to companies, the billing systems have to provide means to develop ratios and indicators for the present situation and the evolution of Telecommunications to the Management Information System.
- As both, real and virtual, companies become more and more complex and change rapidly, the billing systems have to be able to take into account rapid perimeter variations of the client.
- As business goes more and more international, telecommunications billing systems have to become international and not a patchwork of national/regional systems.
- As Fixed and Mobile networks converge, billing systems have to encompass both types of services so as to monitor and enable migration management.
- As TCP/IP becomes more and more used in public and private, local and wide area networks, billing systems have to enable monitoring and control of the migration from traditional data networks to Internet-based networks.
- As Indoor and Outdoor systems converge, billing systems should encompass both type of private networks: PBX's, routers, LAN's etc and public networks.
- As competition increases, E-billing systems have to facilitate benchmarking and multi-provisioning. Especially, electronic catalogues and tariffs have to be made available and equivalent services be coded uniquely.
- As telecom management becomes a real concern to companies, E-billing systems have to provide CDR's, duration and directional traffic monitoring.

Since the rapid development of competition in the fixed telephony, mobiles/wireless and Internet-like data services, operators, in the area of electronic billing, have improved their services to customers. Many of them have modified their internal bill processing software and acquired new software packages. Most of the offers are "operator's-tailored", based on dedicated proprietary, incompatible workstations. Thus, electronic billing is used by operators as a means of differentiation between incumbent operators and new entrants. PNOs using E-billing to hold their customers in order to prevent and lower the "churn" of users is not acceptable.

From a user perspective, especially multi-national corporations, E-billing system openness in telecommunications is mandatory to allow a mature market to develop and standardized management tools are key to it.

Traffic and billing information in its present form is unwieldy. Paper based CDR's are just not suited for to-day's requirements. The capture of billing data has to be automated for it to become useful and operational for benchmarking and matrix manipulation, for Indoor-Outdoor, On-Net/Off-Net comparisons for world-wide applications.

In order to enable consolidation of bills and traffic information from different systems, providers, in different countries common data models, code listing and formats have to be standardized, so as to enable stable internal management applications to be developed.

A Call Details Records (CDR) format has to be defined in order to fulfil this requirement of commonality between networks and systems. This is definitely, according to users' perspective, the kernel of user requirements in the area of TNM. Dedicated PNOs workstations have proven useless in the emerging multi-provider situation.

5.3 Needs for standards in the area of Quality of Service

Quality of Service is a crucial information in the management of telecommunication Networks/services. The QoS information being provided on a periodic basis do not require as many standardization effort as others provided permanently quasi-on line as CDR information which require automated capture.

This topic has already been dealt with in different countries and organizations. The achievements have to be compiled and analysed by users in order to make sure, their needs are reflected properly. For instance the British CPI97 document mentioned below is worthwhile to consider. The main UK operators (non-mobile) are publishing information that allow customers to compare the quality of service they provide. TMA (the UK User Association) along with OFTEL and consumer groups have worked with the Telecoms companies to develop common definitions of performance indicators relating to quality of service of Telecoms. Previous editions of the comparisons were published by OFTEL on behalf of the industry. The industry has now taken responsibility for publication itself while maintaining the same common definitions and audit processes as before.

ETSI has established ETR 138 [1] in relation with ETNO. ETR 138 [1] (Edition 2) has also to be considered in this analysis.

The achievements of both ETSI ETR 138 and UK/CPI-97 shall be taken as a basis of analysis by the user group.

This standardization effort has now to be extended in three directions:

- Voice quality.
- Additional services: Mobiles and data networks.
- Individual Corporation positioning as compared with the average QoS indicators specified in ETSI ETR 138.

A revision of ETR 138 [1] is under way within TC STQ.

Inputs from this revision shall be taken for further User Group work as soon as available.

5.4 Corporate configuration and perimeter management world-wide

The operators should change their habit identifying customers via line numbers and associated payment means and adopt a definition of customers as clusters of companies each associated with an identifier e.g. the fiscal code and described by lists of line numbers. In a situation of companies covering thousands of line numbers, keying individual numbers in a form is totally inadequate.

A corporation with thousands of locations in the world, in dozens of different countries and dozens of Telecom providers needs common data model and automated data capturing in the billing and CDR area. Otherwise, competition will remain an opportunity for providers' business and a joke from a user perspective.

Therefore a perimeter description language has to be specified and standardized, which is able to reflect the individual geographical and business, real or virtual, organizations. The description of the corporation perimeter should encompass all services subscribed from the operators so as customized contracts. This perimeter description is part of ordering the E-billing service to operators. Up-dating the perimeter, in case of by-up, mergers or sell-out of affiliates, shall also use this description methodology.

The UN/EDIFACT messages: ORDERS, APERAK and COMDIS or their equivalent in Lite-EDI/XML formats, should be investigated as a means to describe complex multinational companies with many affiliates, each with many different premises. The EDIFACT ORDERS messages can be used as a valuable corporation describer if lists drawn from corporate internal files can be accepted and interfaced with some automatic message generator.

Migration from UN/EDIFACT (ITU-T Recommendations X.25 and X.400 [3]) transport mechanism towards TCP/IP and XML formats will open up better suppliers to customers relationships and lower the costs without hurting the existing EDIFACT-based data model and coding system.

5.5 Range of services expected

The range of services expected is indicated in figure 3.

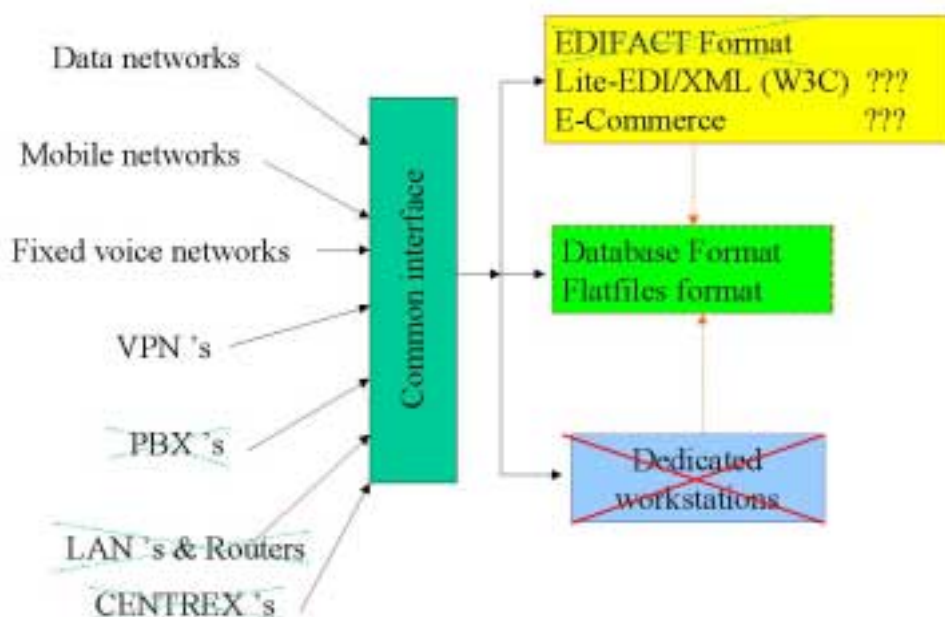


Figure 3: Services and applications required

Services specifically excluded presently from the scope are:

- PBX's because ETSI has not dealt so far with standardization of management information in the PBX's area.
- CENTREX's are just beginning to emerge as PNOs offerings. Special attention should be given to them later, especially in the perspective of Fixed/Mobile convergence.
- LAN's and Router management information are outside the standardization domain. LAN and routers management is, so far, typically a Data processing business and not a Telecom area. Their TNM capabilities are far below those of switched networks.

Since PBX's and routers are generally considered as the CPE interface with public networks and sometimes outsourced, their future inclusion to the scope should be left open.

Outsourcing may raise a particular issue for E-billing, since contracts are based on a service level agreement and no longer on the provisioning of accesses and basic services.

5.6 User-PNO interface: UN/EDIFACT versus E-commerce XML formats

ETIS: European Telecommunication Informatics Services, a foundation where most European operators develop E-billing systems has developed three EDIFACT messages for telecommunication E-billing:

- **INVOIC** for the provisioning of the bills: fixed, mobiles and data (including CDR).
- **PRICAT** for the description of the catalogues according to generic services code listing.
- **ORDERS** for ordering E-billing.

Most of European PNOs have implemented some sort of INVOIC message. ETIS has implemented and maintains on behalf of its members (Deutsche TELEKOM, Telecom Italia, Belgacom, Telenor, MATAV, Polish Telecom, ...) a comprehensive set of EDIFACT messages able to successfully overcome year 2000 burden. Another access should be standardized in order to obtain a full picture of users requirements: the public directories to be interfaced with the CDR's.

UN/EDIFACT is a stable and well-established standard in the Electronic commerce area, but generally limited to Business to Business interchanges. The standard is made of different building blocks:

- a transport mechanism built around ITU-T Recommendations X.400 [3] and X.25 [2] . It is secure, safe and robust;
- a framework of possible messages to be used for orders, invoicing, catalogues, payment, etc.;
- a data model representing with a strict hierarchy the mandatory and optional segments and elements to be included in different type of messages;
- a translator of the messages into transportable formats and the associated dictionary for translation;
- code lists covering:
 - basic services/generic services;
 - all items contained in the operators catalogues: type of networks: ISDN/Telephony, Mobiles, Data, etc.; services, rental, sales, etc., including customer tailored catalogues in the case of outsourcing;
 - partners of the interchange: sales, billing, support, etc. both on the provider and customer side;
 - levels of billing aggregation and details;
 - type of billing information: subscription, traffic, equipment rental/sales, installation, modification of contract, reimbursements, value-added services, etc
 - applicable VAT rates;
 - change in contract situation since previous bill: new subscription, user initiated cancellation, operator's initiated cancellation, modification, change of customer's designation/status, contentious matter;
 - user's selected mode of payment, currency used;
 - tariffs zones;
 - country/area codes;
 - tariffs/discounts per country/zone etc.

These features of EDIFACT standards cover most of user requirements.

EDIFACT has required a detailed analysis and an important effort to implement. The reliability of EDIFACT message interchanges is very high. But the user station is generally complex and costly. XML, an emerging internet based E-commerce format might have more success but should take benefit from the work done with these EDIFACT messages and incorporated data model and code listing as yet defined for EDIFACT messages..

The weak actual penetration of PNOs existing offers, confirms these drawbacks of this initial E-billing strategy already mentioned in subclause 5.1.4. DEUTSCHE TELEKOM sends out 400 000 bills (line numbers) to 800 German customers. Compared to more than 40 million fixed lines and more 10 million mobiles in this country, this achievement represent less than 2 % penetration which is a really a check. Most European PNOs are in the same situation. BELGACOM serves less than 5 % of bills with EDIFACT messages.

This does not mean that the EDIFACT solution should be abandoned. Since rigorous analysis and design has been achieved, data models, coding effort can be easily re-used just by changing the transport mechanism. The Internet based Lite-EDI/XML is certainly a good transport mechanism to be considered among other efficient and cheap transport mechanisms but "Quick and Dirty" applications departing from EDIFACT rules, codes and models should be avoided.

With E-commerce formats, internal accounting applications can be interfaced to electronic, automated billing at low cost and the market for E-billing extended considerably. With data base formats, the corporations can develop internal planning applications. With dedicated stations, the users are locked to the original providers with as many stations as providers.

Figure 4 describes the position of these EDIFACT messages at the interface between the corporation organization and the telecom operator's provision.

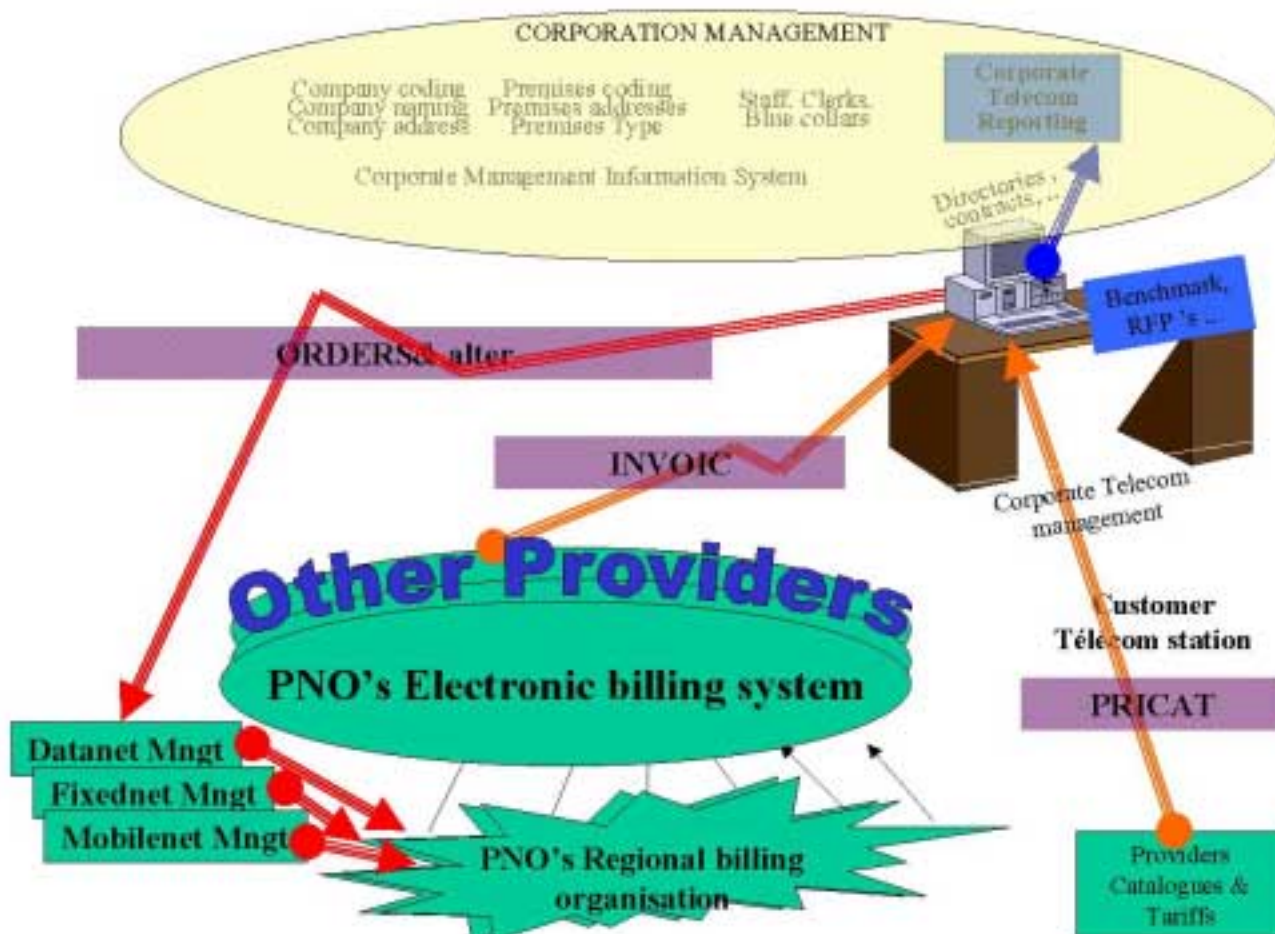


Figure 4

6 Context and Application domain to be covered

6.1 Fixed/Mobiles convergence

Fixed and Mobile Convergence (FMC) is concerned with the provision of network and service capabilities, which are independent of the access technique. This does not necessarily imply the physical convergence of networks. It is concerned with the development of converged network capabilities and supporting standards. This set of standards may be used to offer a set of consistent services via fixed or mobile access to fixed or mobile voice and data, public or private networks.

An important feature of fixed mobile convergence is to make the subscriptions and services, independent from individual access points and terminals and to allow users to access a consistent set of services from any fixed or mobile terminal via any compatible access point. An important extension of this principle is related to inter-network roaming. Users should be able to roam between different networks and to be able to use the same consistent set of services through those visited networks. This feature is referred to as the Virtual Home Environment (VHE).

Taking into account that this definition is relevant to the ultimate goal to reach, users should prioritize the functions to fulfil first in a context of progressive implementation. They should also raise any specific concern they may have in this area. E-bill models, formats and codes common to fixed and mobile networks, voice and data (including TCP/IP) have to be defined and maintained in order to enable monitoring the FMC migration from now to beyond 2002: UMTS advent.

Figure 5 summarizes the scope of Fixed/Mobile convergence from a user's perspective.

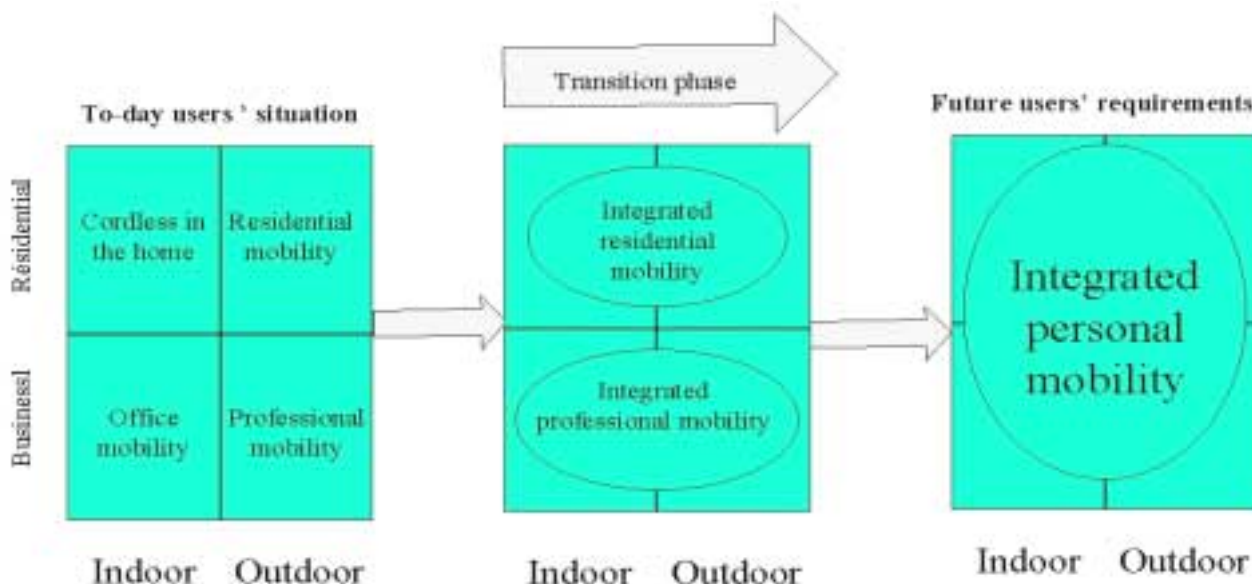


Figure 5: Indoor/Outdoor Convergence

Therefore, PBX's, CENTREX's, VPN's, fixed, mobiles, voice and data, ground based and satellite networks have to be considered, even if not immediately covered, in the definition of a data model to be standardized world-wide.

6.2 Benchmarking requirements

Benchmarking service providers like COMPASS, ANALYSIS, OVUM and GARDNER GROUP, offer services based on a reference group they compare to the actual customer data. This reference database is built up over time from the knowledge accumulated from previous customers. The purpose of benchmarking is to compare one's own situation to the best performers in the world (described in the reference group) or to oneself at an earlier time, and produce recommendations in order to reach best performances.

EVUA (European VPN Users Association) has already introduced a mid-contract benchmarking clause with CONCERT, UNISOURCE and GLOBAL ONE. Most of corporations having outsourced their Telecom traffic and/or CPE's are doing the same.

A new benchmarking process sketched figure 6 becomes possible with this new User-Supplier charging and traffic information interface.

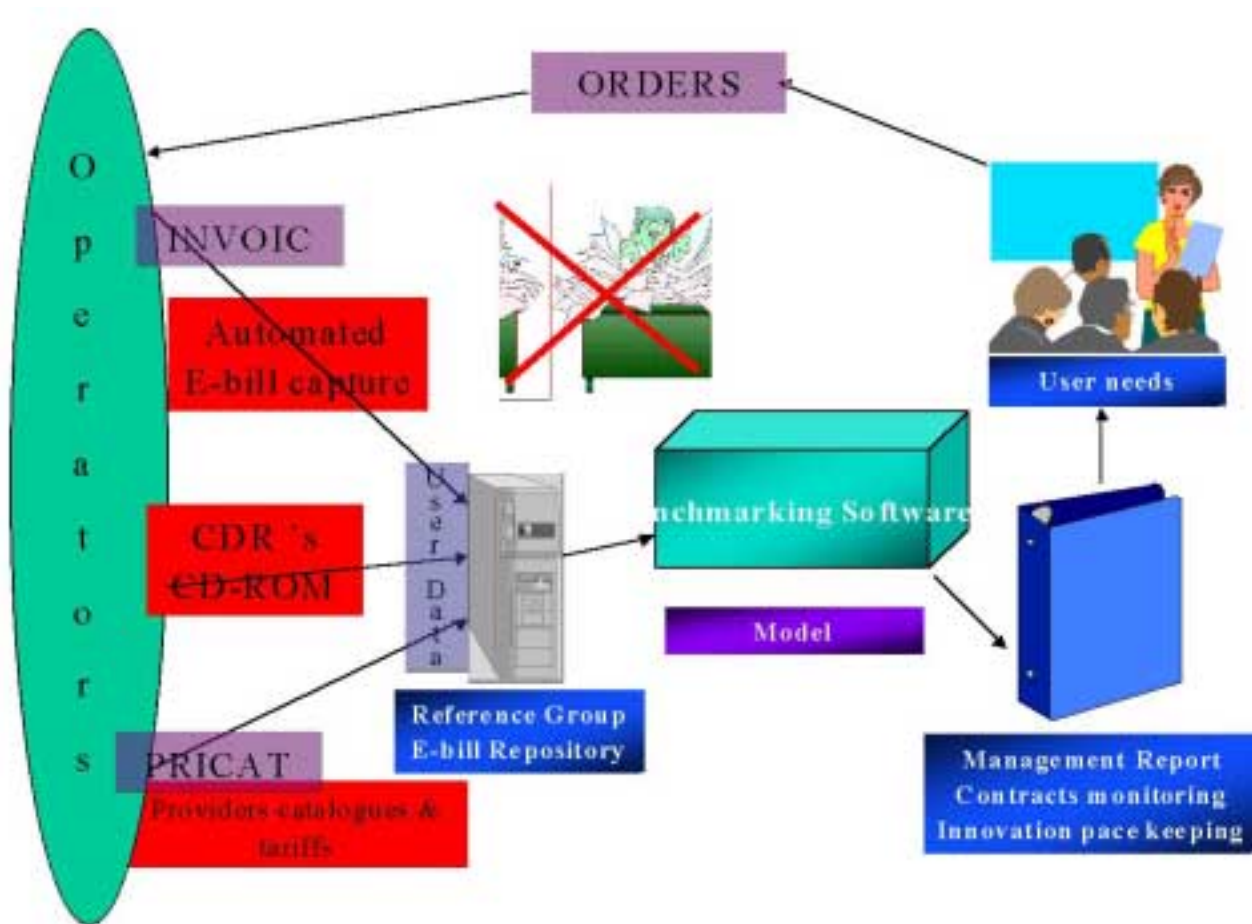


Figure 6: Dynamic benchmarking perspective

Traditionally the user data collection was generally limited to a one week time period because of the burden represented by manually collecting bills and traffic information over a corporation world-wide perimeter. Because of those corresponding costs, such a process was not used more than once a year. The collected data were then compared with those of the "Reference group" and processed according to a model proprietary to the Service Company.

The annual report contained generally:

- a description of the corporation configuration, costs, volumes and traffic;
- a validation of users needs in terms of volume and quality of service;
- recommendations for the installation of "charge-back" systems if necessary;
- simulations in order to take efficient decisions versus evolutive needs and best performing.

Network analysis provides:

- performance comparisons with the other networks logged anonymously in the "Reference group" database or with the customer's performances analysed at an earlier benchmarking, at the best one year ago;
- differences in unit costs, productivity and quality with the "Reference Group";
- synthetic comparisons and recommendations for better performances.

The limitations of the traditional benchmarking process all stem from the very rapidly changing Telecom world:

- The reference group data may very rapidly become obsolete if not fed continuously with fresh data. The information in a traditional benchmarking process, based on a reference group, is updated too slowly to be able to cope with the to-day's rapid changes. Confronted to rapid changes like mobiles, TCP/IP general acceptance in all networks, etc. the efficiency of the traditional reference group of the benchmarks will decrease as rapidly as they become obsolete. The substitution between Fixed and Mobile that already happens in Nordic countries, the advent of UMTS in 2002 and the evolution process between now and 2002 will require permanent monitoring of the situation and positioning with the best, fast moving, performers. A new version of dynamic benchmarking tools is therefore required, permanently fed by E-bills: cost and traffic. Otherwise, the present benchmarking reference bases will lose the value they have today. This new version of expected new benchmarking capability looks very much like a data warehouse associated to Data mining applications.
- The annual report corresponds to a time period much too long as compared with the speed of mobile/Internet penetration and the requirements of Corporate reporting. Reports produced every 2-3 months become now a strong users' requirement. Data collection from paper bills is totally inadequate to satisfy such requirement.

6.3 Request for Proposals (RFP's)

As outsourcing of Customer Premises Equipments and traffic is developing, tools for generating these RFP's become more and more a need to users. Interfacing PNOs billing and traffic information offerings with user applications will enable this facility (see figure 7).



Figure 7: Matrices of traffic

6.4 Regulatory issues: Joint billing & third party billing

National Regulatory Agencies (NRAs) are still puzzling whether joint billing and third party billing are anticompetitive or not. The users' requirement is typically joint billing as represented in figure 8.

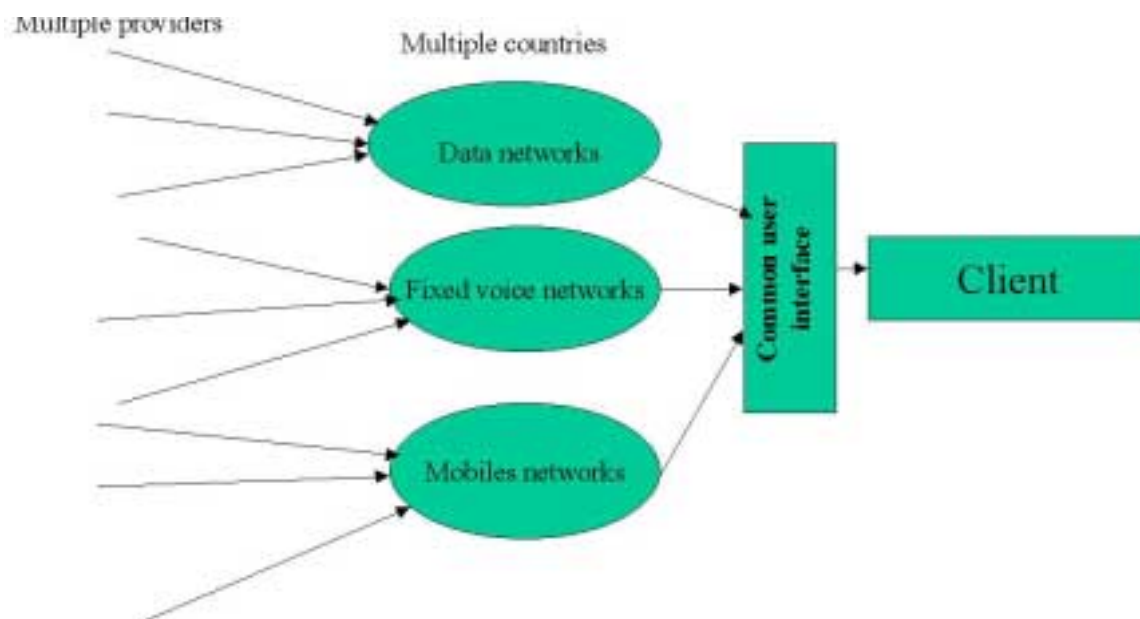


Figure 8: Minimum requirement in Telecom billing convergence

OFTEL is opening the question as formulated below:

"... In a broad sense, joint billing charges for more than one service are included on the same bill in particular where "enhanced services" or goods are included on a bill for a basic service. The issues that arise can be different according to whether the charges are generated by the same company or by more than one company. The present document considers joint billing by BT on the telephone bill and distinguishes between joint billing by BT for itself and by BT for other companies. The principles involved however may apply equally to any operator with significant market power.

The issues that arise from joint billing are likely to increase in importance due to a number of current concerns:

- more vigilant enforcement of the division between BT's Systems Business and its Supplemental Services Business;
- increased potential for resale of BT's fixed services;
- convergence between fixed and mobile services.

OFTEL has received complaints that joint billing by BT for its own services give BT an unfair advantage over companies providing competing services. BT does not accept that joint billing for enhanced services on the telephone bill could constitute undue preference within the meaning of condition 17 of its licence. BT also argues that, for cost and convenience reasons, joint billing is beneficial to consumers and should therefore be permitted. OFTEL believes that some further investigation of the competition and consumer issues is required in order to establish:

- whether there is a sufficient competition case for prohibiting joint billing by BT;
- if BT is permitted to "joint bill", whether there is a strong case for requiring BT to extend this facility to third parties in;
- order to mitigate the competition concerns.

"OFTEL has not reached a firm view on either question at this stage but is seeking views on the issues outlined in this discussion paper, their significance - and any other points which we may have missed. We would also welcome views on possible solutions to the problems identified. We plan to develop the points set out in this paper in the light of comments for a consultation document to be issued early next year...."

Users should analyse this issue and give their point of view to the European regulators.

From a practical point of view it seems evident that collecting bills and traffic information from multiple providers will rapidly become a burden in a multi vendor, multi country environment, even in electronic format. So it seems reasonable to require some type of joint billing from operators, resellers, third parties, etc.

7 Conclusion and recommendations

The user awareness in Telecom procurement is still low but increases steadily as competition develops. PNOs cannot, for ever, rely on immature Telecom customers. Lengthening the process of user maturity will lead to impulsive churn in all market segments and bitterness accumulation. Marketing strategies usual in common public where more is hidden than made explicit, is certainly not adapted to the professional Telecom market segment. The selection of high quality Telecom operators and the rejection of poor quality offers, requires standardization, transparency and customer care. Standardized E-bill delivery might become very rapidly a quality selection criteria. Feature rich standardized E-billing is key in that demand driven selection.

Standardized and open E-billing offers are win-win strategies for both partners. Telecom operators and their customers know that the manual processing of paper documents is expensive. At both ends of the transaction, TELCO's are in the position to create substantial reductions. They can reduce their high expenses for invoicing by using E-billing, which has the potential to save up to 90 % of the dispatch cost for paper bills but, only if customer accounting software is interfaced and a step forward from the fiscal authorities enables paper bills cancellation. Unfortunately EDIFACT has so far not encounter massive acceptance, mainly because of these legal/fiscal limitations, costs and accounting software unreadiness. E-commerce based on Internet has the potential to overcome these bridles. UN/EDIFACT standards are well established and several European operators have developed E-billing on them. This work is mostly reusable to derive rigorous Open Internet-based E-billing standards with higher market potential. Since most of the expected business benefits listed below from automated billing and payment are not yet generally reachable, operators with the same products could initiate the E-billing process targeting management reporting systems benchmarking and rationalized customer churn. The resultant awareness would easily open the accounting path on a second step.

The business benefits can be summarized as follows:

- huge saving for both TELCO's and customers in bill processing (low priority user requirement);
- increasing benefits with the number of customers involved;
- implementation and maintenance costs decrease with standard products;
- simplification of processing and application developments;
- interchangeability of components, packages and applications;
- low training costs for staff.

For the TELCO's:

- quicker delivery of the billing information;
- safer delivery without intermediation steps where things can go wrong;
- dispatch cost savings;
- better data quality and fewer errors, less error handling time;
- better ability to serve the customer;
- more opportunities to customer retention (anti-churn weapon).

For the customer:

- continuous ongoing contract monitoring
- enabling automation of their invoice handling and payment process;
- cost savings;
- better data quality and fewer errors, less error handling time;
- better service from suppliers.

Therefore, this lead to the following users' recommendations in this area:

To fulfil the requirements listed in subclause 5.2, the user Group recommends:

- REC 1** a variety of transport mechanisms for management information: TCP/IP, ITU-T Recommendation X.400 [3] , FTP, etc. should be standardized according to various message formats: EDIFACT, Lite-EDI/XML, Flat files; etc.
- REC 2** API's between supplier and customer should be standardized for dominant PC operating systems (Windows, LINUX, UNIX);
- REC 3** a standardized data model should be developed in order to enable consolidation of bills and traffic information from different systems, providers, in different countries and stable internal management applications to be developed;
- REC 4** a common management information structure should be standardized for all type of Telecom services: fixed, mobile, data/voice;

To fulfil the requirements related to the moving composition of corporation and detailed in subclause 5.4:

- REC 5** a standardized method to describe the corporation perimeter should be developed based on EDIFACT ORDERS, ORDDER RESPON, CHGORDRES messages; etc

To fulfil the requirements as explained in subclause 5.6:

- REC 6** a unique service code list should be standardized for all type of: mode of payment, type of users, generic type of services, interchange partners, detail of subscription, detail of consumption;

As explained in subclause 5.1.4, this imply that:

- REC 7** Invoice, Catalogues and Directories should include this standardized items and that appropriate user interfaces should be developed so that information from different providers may be managed automatically;

Regarding the management of the Quality of Service as developed in:

- REC 8** ETR 138 should be revised to extend to mobiles and data networks;
- REC 9** ETR 138 should be revised to extend to corporation delivery of QoS indicators: performance, alarms & faults, escalation, etc.

The TELCO's have to depart from their traditional concept where a customer is nothing else than a line number, associated with some fuzzy postal address and precise payment mode. In customer care they should all aim to consider the corporation as the customer. Shareholding, management mandates and social consolidation define a Corporation. It covers activities, companies, premises and organization. All these entities, represented by codes in the organization, can be sold, acquired and merged with existing entities and activities.

The E-billing system needs to be able to cope easily with such living structure. The ORDERS message should be designed to cope easily with the life of these organizations real or virtual and handle codes and lists.

History

Document history		
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