Minutes of ENUM Day held on 3 September 2007

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1. Welcome (Andreas Bäß, DENIC eG; Matthias Maier, DENIC eG)

Andreas Bäß welcomed the participants of the ENUM Day and introduced the program with its numerous interesting topics. He also made reference to the difficulties still to be overcome with regard to ENUM and drew a comparison to DNSSEC. Like ENUM, DNSSEC could also look back on a long period of development, but was on the right track now. Then he handed over to Matthias Maier, the anchorman of the day. Matthias Maier announced Wilhelm Wimmreuter, who was going to make a presentation on potential future business models.

2. ENUM Interconnect of VoIP-Islands – Is There a Life after Phone Call Charges? (Wilhelm Wimmreuter, free-lance IT Communications Consultant)

Prior to becoming a free-lance IT Communications consultant Wilhelm Wimmreuter worked with Siemens in the field of network planning. Putting the focus on Carrier (or Infrastructure) ENUM he explained the meaning of ENUM with regard to interconnecting the VoIP islands as they then existed. In addition to that, he presented carrier business models working without phone call charges.

He said that Internet telephony was then characterized by the fact that it was restricted to so-called VoIP islands and that the calls were directed via the PSTNs to connect the various islands. There were different models that provided for direct VoIP peering: A model of open peering did not require any arrangements for billing mediation between the providers. Costs were covered by the connection fees of the subscribers (Bill & Keep). The providers could use Identity Management to generate income. That model was opposed by the closed/controlled peering, in which billing was settled either among the providers themselves or directly through an independent third party. The model was based on a closed ENUM/DNS infrastructure and similar to the former PSTN model. Moreover, one could differentiate be-

tween bilateral and multilateral peering. If bilateral peering was used, every provider had to have a corresponding agreement with every single partner provider, which would lead to the agreements growing exponentially. Multilateral peering, in contrast made administration easier, would provide for the joint use of central resources like databases and gateways and offered advantages with regard to number portability and security. Carrier ENUM too was compatible with several variants of ENUM/DNS architecture. Tier 1 (information about the name server responsible for the telephone number) and tier 2 (the contact data assigned to a telephone number) for example, could be summarized in a central directory. That information could then either be polled by the network operators by means of ENUM queries or placed at their disposal as local replications. Another option was a divided ENUM directory with separate tier 1 and tier 2 information as it is applied in case of User ENUM. Moreover there was a model Wilhelm Wimmreuter titled "Federated Multi Peer Infrastructure". In that model, one service provider granted several network operators access to a copy of the central directory.

With Carrier ENUM there was a particular problem: It included various trees and one had to fear that new trees were created all the time. It was not yet clear how to link the various trees. In this context, Wilhelm Wimmreuter raised the question whether end users would not rather register their own ENUM domain than wait until the carriers agreed on a joint Infrastructure ENUM tree.

According to Wilhelm Wimmreuter growth on the interconnection market could be expected to be produced by IP access and IT support services. The proceeds from PSTN and the mobile telephone system, in contrast, would decrease in future. The end user would rather purchase band width than Quality of Service (QoS). If the band width was insufficient the end user would become aware of it. If, however, a specific band width was guaranteed to come along with QoS, it would become more difficult to make the customer purchase more band width, since he/she would not see any necessity for it. Confidentiality and authentication were no longer produced through wiring and close coupling with network elements ("Trust-by-Wire"), but would be based on passwords and certificates in the future ("Trust-by-Authentication"). The operation of its own ENUM tree by every network operator would result in high costs and efforts. A better solution would be federations with a central ENUM/DNS directory. That would reduce the number of parties to the agreement and the costs. Such type of directory could also contain portability information.

Wilhelm Wimmreuter said that User ENUM, ENUM directories of third parties like XConnect and Neustar, and peer-to-peer systems not based on DNS competed with Carrier ENUM. New income could be generated by making ENUM so attractive to the final customer that he/she was ready to pay for it: One potential solution was to use one single address for several services and networks. Further interesting options were intelligent routing and parallel signalling to various end devices ("parallel ringing") like SIP phones (Session Initiation Protocol) and mobile phones. The end user could then decide from which device he wanted to take the call. It would be important in this context to offer features easy to handle.

Network operators were still responsible for the availability and the quality of the services, and that caused considerable costs. At the same time, however proceeds were decreasing continuously due to declining fees. So the network operators had to reduce their costs on the one hand, and to find new sources of income on the other. Changing the billing method from time- or volume-based rates to flat rates was one possibility to reduce costs. Another solution was to transfer responsibility for purchasing and operation of hardware like phone switches and subscriber end devices to the end user. According to Wilhelm Wimmreuter, Identity Management and Trust Services might open up new sources of income for carriers.

Summarizing the above, Wilhelm Wimmreuter came to the conclusion that ENUM included promising components well able to bring about proceeds. He recommended the network operators to rather sell useful new features to their customers than spend their money on the attempt to reconstruct the existing

telephone system on IP basis. He advocated an open system, into which new functions could easily be incorporated.

For the complete presentation of Wilhelm Wimmreuter please refer to: http://www.denic.de/media/pdf/enum/veranstaltungen/Wimmreuter_20070903.pdf

3. How to Avoid SPAM Calls in IP Telephony (Stefan Liske, University of Potsdam)

Stefan Liske of Potsdam University held a presentation on a concept for identifying and fighting Spam over Internet Telephony (SPIT). He said that the manifold motivations for sending bulk SPAM mails and thus abusing the e-mail infrastructure were going to apply also in the context of VoIP in future. Consequently, one had to expect that VoIP infrastructure was going to be abused too. At that time, SPIT was not yet presenting a serious problem because VoIP was still operated by island solutions. Stefan Liske stated the underlying IP network, the low costs, the possibility to conceal one's identity and the desire to earn money or to spend that of others as reasons for SPIT. Already then, many people were molested by unwanted calls. It had to be expected that this nuisance was going to increase when the VoIP islands were interconnected, thus enabling calls free of charge. Molestation of the callee by SPIT started already when the telephone rang. Many mechanisms like upstream voice boxes, content filters, circles of trust etc. did not work for SPIT identification. The only means to differentiate between SPIT and wanted calls was the analysis of the INVITE message (FROM, VIA, SUBJECT Header, SDP Content) and the time of the call. In general, it was possible to identify SPIT by means of black and white lists and by analyzing the calling and the return call behaviour. Based on those data, one could set up a reputation system. However, that would only be possible, if the calls were switched by providers. In that context, VoIP infrastructure played an important role, since it should provide for the authentication of the callers and of the providers amongst each other.

Stefan Liske described the structure of a reputation system as follows: Based on the telephony behaviour of a caller (occurrence of wrongly dialled calls, average duration of a call, number of contacted persons and of calls made etc.) the provider would work out a pattern to assess when a call very probably was a SPIT call. A SPITCLASS header containing those data would be added to the INVITE message so that the assessment could be communicated to the end user. The end user or the terminal devices of the customer then would have several options how to respond to the call. One possibility would be to adjust the installation at immediate signalling or immediate repudiation in dependence of SPIT probability. Another possible solution proposed by Stefan Liske was to charge fees in order to fight SPIT: In case of calls with high SPIT probability the callee should be able to charge the caller a small fee through SIP requests. In the SIP response the callers could then decide whether to pay the fee or not. That concept was based on the assumption that callers who intended to spread SPIT were not ready to pay the requested fee. The provider could see and understand the SIP message requesting the charge and the reaction to it until the call was started. The retrieved data had an impact on the reputation value, so that an implicit reputation system was created. So the reputation became a function that was influenced by the reaction of the callee (e.g. amount of requested fee) and the response of the caller to a fee request. The overall reputation was derived from the individual reputations of all calls of a specific caller. To be able to charge a fee, the providers had to make available a micro-payment system. No peer to peer signalling was to be permitted. Otherwise the system would not work. All messages had to be sent via an SIP provider. The final decision, however, what to do with the call would still rest with the end user.

Giving a forecast of the future, Stefan Liske said that the performance of the various modules still had to be tested, the reliability of the SIP message be guaranteed and the exact way of interacting of the payment services still be clarified. Moreover, the described approach had to be standardized.

For the complete presentation of Stefan Liske please refer to: http://www.denic.de/media/pdf/enum/veranstaltungen/Liske_20070903.pdf

4. TeamSIP and ENUM – Two Supplementary Solutions (Dr. Thomas Kupec, TeamFON)

TeamFON GmbH is a subsidiary of Teamware GmbH; it is specialized on the optimization of business processes by means of VoIP. For this purpose, TeamFON developed TeamSIP, a product based on standard protocols. Dr. Thomas Kupec explained the advantages of convergent networks that link voice, fax, e-mail and video services and consider them as services within one network. In that context, ENUM could be used for bridging between the various networks. Moreover, ENUM supported multimedia services of business clients. TeamSIP was a multi-tenant IP Centrex solution that stood out by the fact that it was based on standard protocols and had a modular structure. TeamFON offered the supplementary telephone client TeamCenter. ENUM was integrated by the server, and it was the server that carried out the necessary ENUM queries. The selected medium was displayed or announced. Communication within the company could be effected via private ENUM trees. According to Dr. Kupec Team-SIP supported traditional telephony with calls being routed via a gateway to the PSTN as well as ENUM supported VoIP. If the call was an ENUM call the user was informed accordingly by an acoustical and an optical signal. Dr. Thomas Kupec considered that solution as advantageous because it allowed to save telephone costs and to optimize operational procedures and thus again the related costs. The approach of TeamSIP could be considered to consist of two parts: the "telephony" services and the "integration" services. The telephony server was a standard softswitch that supported the SIP protocol. Integration was achieved by an integration server and the telephone clients; it was based on SOA (Service Oriented Architecture).

The telephone client TeamCenter granted access to the integration server and thus to resources like telephone directories, voice mail and call history. Any SIP telephone could be addressed through CTI (Computer Telephony Integration) via the client. TeamCenter could be expanded by means of an API and adapted with the help of skins. Moreover, the client could send SMS. Special interfaces configured as so-called connectors supported the integration of applications like Outlook and Office. They were independent software modules enabling communication with applications via their own interfaces.

All functions could be managed centrally by a web interface of the integration server. They included the management of clients, departments, users and accounts, call billing, the administration of voice boxes and several directories. Moreover, the integration server was equipped with connectors to other system-wide applications like ERP (Enterprise Resource Planning), CRM (Customer Relationship Management) and collaboration systems.

For the complete presentation of Dr. Thomas Kupec please refer to:

http://www.denic.de/media/pdf/enum/veranstaltungen/Kupec_20070903.pdf

5. ENUM-Based Softswitch Requirements (Lawrence Conroy, Roke Manor Research)

Lawrence Conroy's presentation reported on a trial performed in Korea to find out the requirements to be met by ENUM-based softswitches. The results of the trial had already been published in an Internet draft. Mr Conroy said that the Korean government and the industry attached high priority to communication via the Internet and was pursuing a programme to support new addressing schemes, including ENUM. Administration of ENUM domains under the Korean country code (+82) had been assigned to NIDA (National Internet Development Agency of Korea), which was also responsible for the registration

of the Korean ccTLD (Country Code Top Level Domain). Together with the industry, NIDA was testing and advancing ENUM in Korea.

Lawrence Conroy described the operational and regulatory requirements resulting from the actual routing functions to be provided by the softswitches:

The system should be secure, resilient and be characterized by low costs. It must offer a possibility to restrict access and to levy charges. Moreover, it had been made clear that call setup times were to be short and as consistent as possible. Propagation of changes had to be quick. Provisioning responsibility and control should be clearly defined, and the system should be possible to process foreign numbers not included in the system. In addition to that, the system had to be able to handle problems with ease and to provide of great flexibility.

This meant that the softswitches had to be able to carry out ENUM lookups rapidly and consistently with deterministic results. Moreover, updates had to be handed on and propagated quickly. The softswitches must also be suited for future market requirements like number portability and support VoIP-only number ranges.

The ENUM directory had been set up as a combination of Tier 1 and Tier 2. Provisioning had been effected using EPP (Extensible Provisioning Protocol). However, the EPP clients of the two network operators involved had been decoupled from their customer provisioning systems during the process. ENUM entries in the authoritative name servers had been changed by means of dynamic updates (DNS UPDATE). The softswitches of the network operators had been configured in such a way that routing was possible in the traditional way, i.e. based on internal prefix tables, or on the basis of an ENUM subsystem. For an exact description of the routing algorithms see the presentation. The trial revealed that routing based on ENUM caused only a slightly larger delay in call setup than prefix-based routing.

According to Lawrence Conroy the trial had brought about the following results: Network operators had realized that call setups with ENUM worked. It had become clear that centralized provisioning with EPP had been sufficient for the trial, but was unsuited for commercial operation. The combination of Tier 1 and Tier 2 had helped to dispel doubts concerning the necessity to rely on other network operators in order to be able to reach the required performance. The trial did not cover number porting. Numbers with unknown destination had always been routed to PSTN, which was not sensible in case of VoIP-only numbers. ENUM domains with a large number of NAPTR RR could turn out to be difficult, because not all name servers supported EDNS0 at that time.

Mr Conroy thought there were a few items left to work on until productive operation could be started. The trial did not reveal any difficulties concerning fail proofness of the combined Tier 1 / Tier 2 architecture. In other countries with other regulatory regimes, however, that architecture might become a challenge in productive operation. That also applied to the provisioning of the individual numbers. Therefore, ENUM provisioning should be integrated in each carrier's customer administration system. It also remained unsettled, if and to which extent public access to the ENUM directory was required. For productive operation, ENUM had to be considered a "mission-critical" system, which had to avoid long call setup times and be able to propagate changes without delay to the components involved. Moreover, number portability had to be taken into account. Unused numbers in VoIP-only number ranges needed special treatment to prevent routing to PSTN, which was not useful.

Lawrence Conroy told the auditors that two interlinked trials were then being executed in Korea and China. Both of them used ENUM also for phone number porting. The carrier to whom a phone number had been ported, entered a new SIP-URI in the corresponding ENUM domain. However, only calls from trustworthy providers were received. The call number porting procedures could be compared with the provider change procedures of .kr or .cn domains.

At the end of his presentation, Lawrence Conroy requested everybody who had been involved in other ENUM trials to contribute to the corresponding IETF draft.

For the complete presentation of Lawrence Conroy please refer to the following link:

http://www.denic.de/media/pdf/enum/veranstaltungen/Conroy_20070903.pdf

6. Current State of ENUM at RIPE (Carsten Schiefner, RIPE ENUM Working Group)

Carsten Schiefner started his presentation with a survey of the various Internet bodies dealing with ENUM. He continued with a detailed description of the tasks of RIPE NCC and RIPE. He then explained that the IETF (Internet Engineering Task Force) was responsible for the standardization of the protocol. The IAB (Internet Architecture Board) was in charge of DNS-related aspects of ENUM and ITU-T (International Telecommunication Union – Telecommunication Standardization Sector) of PSTN-related ones. Another body engaged in the ENUM matter was ETSI (European Telecommunications Standards Institute).

RIPE NCC (Réseaux IP Européens Network Coordination Centre) was the operator of the Tier 0 Registry. RIPE NCC had been assigned that function because it was a neutral unbiased organization, which was experienced in running a stable and reliable DNS and able to provide a DNS infrastructure quality comparable to that of the root server system. Other reasons for choosing RIPE NCC had been its good reputation and well-established contacts to technical and administrative bodies.

RIPE in contrast, was an informal collaborative forum open to all parties interested in wide area IP networks. Various working groups had emerged from it, including the ENUM Working Group. The ENUM Working Group reviewed reports from the relevant IETF working groups, activities like the ETSI ENUM plug tests, reports by RIPE NCC and up-to-date information from the countries in which ENUM delegations existed. Other focal items were the ENUM registration processes, Infrastructure ENUM, statistical analyses, setting up a task force for improving quality at the Tier 0 and Tier 1 levels and ENUM security packages. The RIPE ENUM Working Group was open to registries, registrars, registrants and all other interested parties. To participate, one could subscribe to a corresponding mailing list under http://www.ripe.net/ripe/wg/enum/ . Twice a year, there were RIPE Meetings. The topics on the draft agenda of the next meeting of the ENUM Working Group included "Internet Emergency Call Support", new ENUM services, Infrastructure ENUM with DNAME and the presentation of a Dutch diploma thesis on Infrastructure ENUM.

For the complete presentation of Carsten Schiefner please refer to:

http://www.denic.de/media/pdf/enum/veranstaltungen/Schiefner_20070903.pdf

7. ENUM and DNSSEC - (Inter)national News - (Peter Koch, DENIC eG)

Peter Koch's presentation reported on the current developments in the fields of ENUM and DNSSEC. He said that the paragraph on security in RFC3761, on which ENUM was based, already mentioned that DNSSEC could solve many security problems arising in connection with ENUM. Due to the fact that a telephone number was mapped onto a domain and the domain in turn to URIs by means of NAPTR-RR, ENUM introduced another level of indirection, which could not be protected by TSL or SSL. DNSSEC offered authentication of the data source and ensured integrity of the data. Even the non-existence of NAPTR-RR could be proven reliably (authenticated denial). Since ENUM was a service with its own namespace, DNSSEC could be introduced for ENUM independent of other Top Level Domains. As explained in the presentation of Carsten Schiefner, there were several parties to ENUM. Besides the trian-

gular relationship between the organizations IAB, ITU-T and RIPE NCC as Tier 0 Registry, there were the Tier 1 registries, the Tier 2 registrars and the registrants.

In July 2007, the RIPE NCC had informed IAB that e164.arpa was ready for DNSSEC. After having reviewed the plans of RIPE NCC, IAB had informed ITU-T. Being an associated member of the ITU-T Study Group 2 and Tier 1 Registry for the German telephone number space, DENIC had supported the plan. Since IAB gave positive feedback, the e164.arpa zone was probably going to be signed still in 2007. IANA (Internet Assigned Numbers Authority) was preparing the signing of the arpa zone. In Poland (+48), signing had already been started at the Tier 1 level. In Germany (+49), DNSSEC was being planned and prepared for launching. Implementation was proposed to be performed in two stages. First 9.4.e164.arpa was to be signed. That would provide a means to prove the non-existence of ENUM domains. The key signing key of the zone could be registered with Tier 0. Such procedure was transparent for the registrars and registrants and did not require any system adaptations. In a second step, the keys (more precisely: key signing keys) of the delegated zones would be accepted and published by means of so-called DS Resource Records. As a consequence, data sources were authenticated and data integrity secured. That step required some adaptations on the side of the ENUM registrars. For DNSSEC to bring about improved security, however, clients had to carry out a corresponding DNSSEC validation.

For the complete presentation of Peter Koch please refer to:

http://www.denic.de/media/pdf/enum/veranstaltungen/Koch_20070903.pdf

8. How to combine ENUM, Number Portability, Caller Location for Emergency Services and Central Database of Telephony Subscribers? (Andrzej Bartosiewicz, NASK)

Andrzej Bartosiewicz from NASK, the registry for the Polish Top Level Domain (.pl) and Tier 1 ENUM registry for the Polish telephone number space (+48), reported on the current developments and plans with regard to ENUM in Poland. A specific problem in Poland at that time was that the telecommunication network operators had to approve every delegation of ENUM domains. An application requiring to amend the rules for the allocation of ENUM domains had already been filed.

When joining the EU it had become mandatory for Poland to provide for the possibility of number porting. However, there were not yet any central databases for that. Neither was there a database for localizing the caller in case of emergency calls nor was Infrastructure ENUM implemented. To cap it all, problems with the national directory inquiries had occurred.

NASK wanted to improve the situation. Andrzej Bartosiewicz presented a concept it had developed for a central system, which offered phone number portability according to the All-Call-Query method, caller localization services for emergency calls, a national telephone directory and Infrastructure ENUM for telecommunications companies and possibly even User ENUM.

The requirements to be met by a central localization system for emergency calls (112) included an XML-based interface that supported the Mobile Location Protocol (MLP) for tracing the caller's location and also the Extensible Provisioning Protocol (EPP) or E.115 for granting access to subscriber data. It was essential that the data were kept as up-to-date as possible. Access to the system should be granted to the carriers and the responsible emergency services. It was a matter of course that security packages including confidentiality and authentication features as well as fail proofness and high availability had to be safeguarded. In addition to that, high performance and scalability were required. Different data had to be stored and administered for the different types of users, i.e. PSTN subscribers, mobile subscribers and nomadic users. Moreover, one had to decide on the method for accessing data. Here, one had to distinguish between the push and pull method. When the push method was applied, the network operator communicated the location of the caller directly to the responsible emergency center. In case of the pull method in contrast, the control center requested the location of the caller from the network operator,

which could lead to a few minutes delay. The European Community principally is in favour of the push method because it takes less time.

According to the ideas of Andrzej Bartosiewicz, a portability database could be integrated with the localization service for emergency calls. In both cases, information about the network operator responsible for a telephone number was required. The interface to the portability data base should also be based on SML. Both the network operators and the national regulatory authority should have access to that database. In addition to the All-Call-Query method (ACQ), which included a query to the database for each call, the Query-On-Release method (QoR) should also be supported. The latter only made a query if the telephone number had been ported away from the network operator to whom it had been assigned originally. The portability database also would have to meet high requirements with regard to security, reliability, availability, performance and scalability. An integrated system would offer lower costs due to the use of a uniform infrastructure, a uniform access for the network operators and thus a simplification of the system. The central telephone number database could be implemented with ENUM and the ENUM service "PSTN". To proof the concept, NASK had developed an XML solution for number porting that was based on EPP. Another feature offered by that solution was the possibility to store information about the telephone number areas assigned by the National Regulatory Authority.

If the localization service for emergency calls was integrated in the central telephone number database, Infrastructure ENUM could be used as a platform. Andrzej Bartosiewicz stated the comparable requirements with regard to security, availability and scalability, the central role of the network operators for the three applications and the migration to Next Generation Networks (NGN) as arguments in favour of that integration.

The data stock resulting from the integration of a central localization service for emergency calls, telephone number database and Infrastructure ENUM could be used for a national telephone directory and be placed at the disposal of the final users via suited call centers. In addition to that, the caller could trace the network operator responsible for the desired telephone number and thus also find out the applicable price.

Andrzej Bartosiewicz concluded his presentation with a brief report on the progress that had been made with a central database in Poland. First efforts to establish a central portability database dated back to 2003. Since 2006, telephone numbers could be ported; however, there was no central portability database. At the beginning of 2007 the Polish Regulatory Authority had resolved to integrate telephone number portability with the localization service for emergency calls and to set up a central database for that purpose. All mobile network operators and some PSTN operators in Poland had spoken out in favour of integrating ENUM too. To do so, the telecommunications law had to be amended; the Polish parliament was processing the matter. The central database was to be controlled by the Polish Regulatory Authority and financed by fees charged for the assignment of number areas. There would probably soon be a public call for proposals for operating the central database.

For the complete presentation of Andrzej Bartosiewicz refer to:

http://www.denic.de/media/pdf/enum/veranstaltungen/Bartosiewicz_20070903.pdf

9. NGN Voice and Carrier Interconnection for IMS and non-IMS-based Architectures (Hans Mathys, Cisco Systems)

Hans Mathys' presentation introduced Cisco's global IP-NGN architectures for developing IMS- (IP Multimedia Subsystem) and non-IMS-based products for service providers and explained Cisco's roadmap for the integration and interfaces of ENUM.

Due to the changing expectations of the customers the boundaries between contents and applications on the one hand and end devices on the other became increasingly blurred. That growing complexity

demanded a new model for service provider and network infrastructures. The customer wanted communication and access to information be easy, of a broad range, flexible and available at any time and anywhere (at home, at work, on the move …). Multiple layers of convergence were required in that process: Convergence took place on the network layer, the service layer and the application layer. Hans Mathys went into the service layer and the "Cisco Service Exchange Framework" established on that layer in greater detail. The intended target was to provide all applications with all data of the network anywhere on any end device. The Service Exchange Framework also could be grouped into three areas. The first area, the management of identities and mobility included the management of user and end device identities, the registration with services as well as presence and site information. The second area was the management of guidelines and resources. The third area, the session and media management, did not only comprise the call and media control but also the provision of the necessary band width and quality of service (QoS) as well as billing. The aim of that architecture was not to introduce a new complexity layer but to integrate new functions in the network elements. Cisco's Service Exchange Framework supported IMS-based as well as non-IMS-based applications in that respect. A central service control point was created for the different types of access at network layer like DSL, cable, cellular and wireless.

A crucial element of the infrastructure of Voice Service Providers was the Session Border Controller, which enabled direct IP-based connection between multiple administrative domains and was also responsible for security, access control and interworking of protocols. A Session Border Controller also included NAT and Firewall-Traversal as well as billing functions. Moreover, they were important for lawful telecommunications interception. The functions for controlling the signalling and the media data flow could either be integrated in one device or distributed to several ones.

Hans Mathys continued with the softswitch solutions of Cisco. Cisco intended to introduce ENUM for all devices by mid-2008. Cisco Database for Telecommunications, CDT, played a critical role in this respect; it did not only support the protocols of the Intelligent Network (IN) but also DNS, SIP and ENUM with regard to telephone number portability. CDT offered excellent performance and great capacity of up to 200 million subscribers. The Cisco Media Gateway Controller PGW 2200 had ISUP (ISDN User Part), PRI (Primary Rate Interface), H.323 and SIP interfaces and thus created a PSTN gateway by means of the appropriate media gateways, i.e. it formed a bridge between PSTN and IP networks. By the end of 2007 it was expected to support ENUM too, so that it was able to retrieve the data stored in the telecommunications database by means of ENUM. The softswitch BTS 10200 supported a large number of protocols and also had an ENUM interface, so that ENUM-based on-net routing taking into account number portability was made possible.

Hans Mathys came to a close raising the question whether IMS was the right solution for all requirements of the service providers. He pointed out that a considerable share of the utilized band width was resulting from services not controlled by the service provider. One could gain proceeds also from such services. That was why Cisco supported IMS- as well as non-IMS-based services.

For the complete presentation of Hans Mathys please refer to:

http://www.denic.de/media/pdf/enum/veranstaltungen/Mathys_20070903.pdf

10. Status Report from IETF: ENUM and SPEERMINT (Otmar Lendl, enum.at)

Otmar Lendl from the Austrian ENUM registry enum.at informed about current developments in the IETF Working Groups (WG) ENUM und SPEERMINT (Session PEERing for Multimedia INTerconnect). In his view, the tasks were distributed among ENUM and SPEERMINT as follows: The ENUM WG tried to find solutions how to get the underlying contact address (usually SIP-URI) of a telephone number, whereas

the SPEERMINT WG was busy with the question how to get the data required for setting up a session that involved various administrative domains.

There were not many news about User ENUM. However, an update of the ENUM-RFC3761 was being planned in order to settle some questions. Patrick Fältström's proposal concerning the simplification of NAPTRs and the integration of User and Infrastructure ENUM had been rejected due to problems with open numbering plans. Another topic of discussion had been to define a process for the registration of new ENUM services, which would still work when the ENUM WG no longer existed. The then submitted proposal suggested a review by experts. Other drafts reflected experiences made with implementations of ENUM. A larger not yet completed item of discussion were the drafts for Infrastructure ENUM. The major difference between that variant of ENUM and User ENUM was the unit entitled to make entries: In case of Infrastructure ENUM it was the carrier, in case of User ENUM the end user. The current drafts dealing with Infrastructure ENUM described general requirements, a potential long-term approach and an interim solution. The interim solution proposed to use the existing infrastructure of User ENUM (e164.arpa). A separate branch for Infrastructure ENUM should be established under the country code. Such a solution would transfer the decision whether to offer Infrastructure ENUM or not to country level. No new agreement between ITU and IETF would be required. The solution should provide for easy switching to a long-term international solution, which was planned to be implemented with a branch independent of User ENUM. According to Otmar Lendl the fact that the information was available to a large number of carriers was an argument in favour of public visibility of Infrastructure ENUM. All carriers in all countries should have access to the data. Security measures could thus also remain effective after having gained a SIP-URI corresponding to a telephone number.

The SPEERMINT WG was discussing interconnection between various SIP providers because IETF had realized that there remained some items to be solved. Particularly the cable network operators of North America were strongly involved in the work of the group. According to the process diagram of the WG, they first wanted to define the terms and subsequently describe the use cases, which would provide a basis for deriving requirements that must be met. Those in turn would then be the basis for defining the architecture, from which further necessary documentation was deduced. Otmar Lendl criticized that the members of the Working Group had no precise idea how to proceed. In particular there was no precise problem analysis. In addition to that, expectations varied widely among the interest groups. The document about the architecture was intended to be completed in the first quarter of 2008. That target would apparently not be reached. Otmar Lendl feared that the process defined by the Working Group was not going to work. For that reason, he presented his own proposal for solving the problems. The target should be to avoid that any call originating from and addressed to IP networks had to be routed via the PSTN. At present there were numerous SIP telephones, but only few of them could be reached directly via SIP. There were no technical reasons for that, since the technology principally enabled universal VoIP interconnection. VoIP islands were used on the one hand because people were afraid of risks originating from the Internet and on the other because the carriers were not prepared to communicate or peer with everybody. But there were interconnections of VoIP islands through private agreements and commercial suppliers. Otmar Lendl saw the cause for the existing problems in the fact that SIP proposed a VoIP interconnection procedure similar to that used for e-mails. Such a solution made open SIP proxies that accepted calls from any administrative domain mandatory. As a result no more interconnection fees could be charged, since no additional peering agreements would be necessary. Other reasons frequently stated against the model were the SPIT risk and the need to fight DoS attacks. On top of that, the model did not support a guaranteed quality of service (QoS). Given the fact that the e-mail model was not being approved, one had to consider alternative solutions.

In Otmar Lendl's opinion, SPEERMINT was not able to achieve universal peering. Up to that point in time it had not yet worked out any reasonable approach to solve the SPIT problem, and besides, it had

tried to solve operational problems, although it was a technical Working Group. So the only aim to be pursued was to provide for the possibility of simple, flexible and widely spread peering. Since it had to be assumed that there was no direct interconnection between all service providers, transit was required to safeguard worldwide availability. Accepting the necessity of transit would bring about a classical routing problem. One had to agree on one or the best solution in this context. Perhaps a more flexible protocol than the Border Gateway Protocol (BGP) was required. The mechanisms provided for that by SIP in RFC3263 were insufficient. Moreover the question of the identifiers to be chosen for the routing arose: telephone numbers, SIP-URIs or others. As regards the architecture Otmar Lendl proposed to use the mechanisms of Infrastructure ENUM to map the selected telephone number onto a so-called SIP Address of Record (AoR). Those SIP-URIs must not necessarily be resolvable according to RFC3263 nor be reachable via the Internet. According to that proposal it was the task of SPEERMINT to resolve the "SIP-AoR" to the next hop.

All in all, three logical steps could be defined. The first step (lookup step) served for mapping the telephone number onto the operator. In the second step (policy) it was decided whether direct peering was possible, a detour via a transit service provider required or whether the target could not be reached at all. In the third step (location) the IP address, the port and the TLS settings of the next hop were determined.

Coming to a close, Otmar Lendl said that Infrastructure ENUM was on the right way and that Austria was already practicing an interim solution. SPEERMINT as it stood at that time, however, was called a disaster by him. Otmar Lendl has laid down his ideas and solution proposals in a few Internet drafts, which can be found in the presentation.

For the complete presentation of Otmar Lendl please refer to:

http://www.denic.de/media/pdf/enum/veranstaltungen/Lendl_20070903.pdf