

Carriers and Users Prepare to Midwife ENUM

Greg Goth



The long-awaited debut of ENUM – the mapping of globally recognized telephone numbers to the Domain Name System – is beginning in earnest, although the technology is still not quite ready for widespread deployment.

Promoted as a way to enable end-to-end voice-over-IP (VoIP) connectivity and various other IP-enabled applications, ENUM was long expected to be controlled by end users. However, recent industry activity and standards-body discussions have turned the notion of end-user ENUM on its head, instead favoring carrier ENUM or infrastructure ENUM – that is, VoIP service providers will exchange information among themselves about ENUM-enabled numbers, thus avoiding fees collected by public switched telephone network (PSTN) companies for bridging calls between VoIP providers.

Early Indicators

Several companies have recently announced the availability of ENUM registries, into which member service providers can place their customers' IP-based numbers. Among them are New York City-based Stealth Communications, which has established an ENUM registry as part of its Voice Peering Fabric, a distributed layer-2 Ethernet exchange designed for VoIP traffic. The service allows VoIP-enabled entities to directly connect to each other. Participants in the registry, announced in April 2004, include

Acropolis Telecom, Addaline.com, Free World Dialup, MIT, Net2phone, Packet8, and Yale University.

In May 2004, Verisign announced its direct VoIP connection service, MSO-IP Connect, which features a centralized call-routing and discovery database based on ENUM, and the PacketCable Session Initiation Protocol (SIP)-based Call Management Server Signaling Protocol.

Under casual examination, these announcements might appear to signal that carrier ENUM is a *fait accompli*, and that one of the last remaining obstacles to low-cost end-to-end VoIP connectivity has been removed. However, the divergent philosophies behind the original intent of ENUM (in which end users control the provisioning, attributes, and accessibility for their assigned numbers) and carrier/infrastructure ENUM (in which the carriers retain control of the information for their own connectivity reasons) has caused the IETF's ENUM working group (www.ietf.org/html.charters/enum-charter.html) to dig deeper into the technology and lay more groundwork before ENUM is ready for the mass market.

"We did an ENUM directory service where enterprises and MSOs [cable multiple-system operators] can connect to us and we'll connect them through our directory," says Tom Kershaw, vice president of next-generation networks at Verisign. "What we found was the success rate of those calls was basically zero."

Essentially, there are currently too many incompatibilities between SIP and the International Telecommunications Union's H.323 protocol, as well as too many incompatibilities within SIP deployments, to ensure VoIP connectivity.

"Within SIP there are some pretty serious interoperability challenges," Kershaw says. Key among them are problems in standardizing basic functions, such as dual-tone multifrequency technology and two-way audio between endpoints.

"The movement toward SIP is rapid," he says. "But the reality is where the endpoints are today, and the protocols in the enterprise are all H.323. There isn't a lot of SIP out there at this point. So we've been looking at what end-to-end connectivity looks like, particularly around the enterprise case, which allows endpoint 1 to talk to endpoint 2 in IP. A VoIP directory is an important part of it, whether it's ENUM or SIP, but you also have to have the connectivity layers dealt with for true ENUM to happen."

Philosophical Questions, Technical Headaches

In addition to the signaling-level problems, ENUM backers are facing a higher-level question of how to deploy carrier ENUM based on its assigned e.164.arpa domain – or if it's even possible to do so – given the divergent needs of end users and carriers.

"The thing that's probably of greatest interest to the industry at

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IBM announced in August that it is contributing “**Derby**,” a copy of its **Cloudscape** relational database code, to the **Apache Software Foundation**. The transfer, which totals more than half a million lines of code and is valued at US\$85 million, will be one of the largest proprietary code transfers ever and is intended to spur developers to write more applications in **Java**. Derby requires only 2 Mbytes of memory and no administration, making it easily embeddable. It will primarily target applications that don’t require a full enterprise database, such as small Web sites and departmental systems. The Apache Incubator will manage the project initially, inspecting the code to ensure that it conforms with Apache’s licensing and code-integrity standards, and will also oversee the formation of a development community.

More information is available at www-306.ibm.com/software/data/cloudscape/news.html.

The **Internet Engineering Task Force** has released **Sender ID**, a revised version of the **Mail Transfer Agents Authentication Records in DNS** draft, which merges the Sender Policy Framework specification with **Microsoft’s Caller ID for Email** proposal. Sender ID is an effort to simplify the adoption of email authentication technology and provide email users with better spam protections.

Coauthor Meng Weng Wong’s informational draft, “Behind the Curtain: An Apology for Sender ID,” is available at www.ietf.org/internet-drafts/draft-ietf-marid-rationale-00.txt.

The **Mozilla Foundation** has announced a “**Security Bug Bounty**,” offering US\$500 to users who report critical security bugs. With initial backing from **Lin-spire** and venture capitalist **Mark Shuttleworth**, Mozilla said it was launching the effort to aid in both vigilance and a quick and effective response to software security vulnerabilities.

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this point is an ENUM solution to enable voice peering,” says Tom McGarry, vice president of strategic technology initiatives at Neustar, an Internet registry and telecommunications services clearinghouse. “You can’t pick up a newspaper, much less the trade press, without an article about somebody rolling out a VoIP service. Those carriers are trying to figure out what they need to do, and they’re trying to shoehorn carrier ENUM into e.164.arpa. The jury is out as to whether they’ll be able to do that successfully. The things that public ENUM and e.164.arpa stand for at its core may be contrary to the things carrier ENUM stands for at its core. Public ENUM puts the user in control. It’s creating a standard where a lot of grassroots activity can happen. Carriers are interested in exchanging the information among carriers, and they don’t want other entities to have that information.”

In fact, McGarry says the confusion over how to proceed with carrier ENUM might be a prime element in delaying the creation of a nationwide ENUM Tier-1 administrative entity in the US. ENUM requests to that entity would, in turn, point to Tier-2 name servers or IP addresses where ENUM subscribers receive service.

“In public ENUM, the holder of the number has the ultimate say in what goes in Tier 1,” McGarry says. And, consensus wisdom holds that the vast majority of users would probably depend on their service providers to provision both Tier-1 and Tier-2 records. But McGarry says the fact that the user holds ultimate control could cause connectivity nightmares if they were to overwrite records written by their providers.

A Likely First Step

Both McGarry and Kershaw predict that the first wave of widespread ENUM deployments won’t be between VoIP carriers serving the consumer market but rather between aligned

organizations such as technology consortia and business alliances.

“Private ENUM makes more sense right now because you can drive your resolution rates much higher by orienting your private ENUM database toward communities of interest and enterprise supply chains,” Kershaw says. “If the chances of me calling you are greater than 50 percent, ENUM makes a lot of sense. If the chances are .00001 percent, then just statically put the routes directly in your Softswitch and be done.”

McGarry says several efforts to deploy private ENUM are already under way. In a permanent reference document issued in 2003, the GSM Association included the use of ENUM in its plan for establishing a private DNS for relaying Multimedia Messaging Service (MMS) messages between carriers in its GSM Roaming Exchange (GRX) (<http://216.239.39.104/search?q=cache:t-1B4wjf2qgJ:www.gsmworld.com/documents/ireg/ir52310.pdf+grx,+enum&hl=en#16>).

“The DNS tree hierarchy and administration separation from the Internet DNS enables easier and faster integration of new DNS functionality that is required or useful within MMS, such as the introduction of ENUM,” the document states. “For example, MMS and IMS will benefit from ENUM functionality. Propagating this functionality to GRX DNS should be possible with minor effort. Thus, it is preferred to use both the GRX DNS hierarchy and the GRX transport network in MMS internetworking.”

McGarry says Neustar is also deploying an ENUM application that will enable peering of MMS messages between carriers. The service culls records from the relevant number-planning administrator, the relevant pooling administrator, and the regional number portability administration center (NPAC), and it provides carriers a database they can query to discover a given number’s provider.

“What made that issue important to

the carriers was wireless number portability," McGarry says. "Once portability hit, they needed to look for a highly reliable, scalable technology."

Politics and Infrastructure: Oil and Water?

While the vanguard of ENUM deployments might be in the private domains, the specifics of deploying carrier ENUM in the original conceptual framework of e.164.arpa on the public Internet has caused a new debate within the IETF's ENUM working group.

The question has generated enough discussion that the working group scheduled a mini birds-of-a-feather session for the IETF 60 meeting in San Diego in August 2004.

Two AT&T engineers, Penn Pfautz and Steve Lind, authored a draft proposal placing both public end-user ENUM and carrier ENUM within the same DNS tree. Essentially, the two argue that Tier 1 should include two *naming authority pointer* (NAPTR) records containing separate service parameters for a given number; one would point to the end user's Tier-2 records and one would point to the carrier's Tier 2. The original ENUM architecture calls for Tier 1 to contain name-server records that simply point to the Tier-2 records containing the actual NAPTR records.

However, other working group members have objected to the proposal, warning that trying to delineate between the two purposes on the same tree could prove technically problematic, and that governments' political concerns about placing their carriers' records in the US-government-controlled .arpa domain could echo similar concerns voiced about public ENUM, delaying or derailing such deployment.

Richard Stastny, chair of the Austrian ENUM Forum, says the single-tree concept leads to unnecessarily complicated technology, in addition to the political concerns that might again

arise over e.164.arpa.

"It's hard to set up service if all countries aren't in," Stastny says. "If the Austrian service is in and nobody else is, you can't get outside Austria."

The Austrian ENUM group might be the first to discover how viable public ENUM is. Stastny says the group has decided to try launching commercial ENUM service in October 2004 to observe how the market responds.

"We'll see how the ISPs or phone companies will market it," Stastny says. "In my opinion, they haven't decided yet. They can do it with a big marketing effort or a slow launch."

Yet Verisign's Kershaw says results out of a relatively small market such as Austria shouldn't be weighted too heavily in assessing ENUM's overall potential.

"There are some real challenges to ENUM if you want to adopt the carrier model," he says. "For example, they're all probably going to go down the SLA [service-level agreement] route, with features like QoS-enabled broadband networks, a little higher cost but a guaranteed QoS approach. What are the rules about how that call's actually handled and routed according to the different SLAs in place? The idea that one size fits all on the network side of this is probably not accurate.

"I'd really be interested to find out what somebody like Bank of America's CIO thinks about ENUM. How does he want to connect his network to the public network? Who sets those rules? We have to make sure the different end-user groups are represented in those decisions, and I don't think it's necessarily a good idea to take the point of view of an SIP engineer who's sitting at home and writing his own client. That guy's not normal from a target-market point of view." □

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More information is available at www.mozilla.org/press/mozilla-2004-08-02.html.

The **US Federal Communications Commission** issued a notice in August that tentatively said that **Internet telephony** should be subject to traditional wiretap laws, which could force voice-over-IP providers to comply with the same rules as telephone carriers. On 9 August, the commissioners released a Notice of Proposed Rulemaking, voting 5-0 that the **Communication Assistance for Law Enforcement Act** should apply to facilities-based providers of any type of managed or mediated broadband Internet access service; nonmanaged services such as instant messaging and voice services that are unconnected to public switched telephone networks would not be affected.

The FCC's NPRM is available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-250547A3.doc; the press release and individual statements on the NPRM from individual commissioners are available at www.fcc.gov.

According to a new survey of 500 **Linux developers** released by **Evans Data**, a California-based research firm, 92 percent have never had their machines infected by malicious code, and only 22 percent said they'd ever experienced a hacker. Of the surveyed developers, 76 percent said the recent lawsuit filed by the SCO group against IBM — which alleged that the company had improperly inserted proprietary Unix code in the Linux kernel — would "probably not" or "absolutely not" affect their company's Linux adoption.

A summary of the survey is available at www.evansdata.com/n2/pr/releases/Linux04_02.shtml.

An overview of the SCO suit is available at www.linux.org/news/sco/index.html.