Reinventing telecom with Linux and VoIP

Bill Weinberg describes the latest developments that are using Linux in VoIP applications.

Linux and VoIP, both disruptive technologies, are in the process of reinventing development and deployment of next-generation telecommunications applications. Linux and VoIP are truly disruptive in that they radically alter the status quo in both technology and business practices in a range of application domains. In the case of telecommunications, the Open Source OS and IP-based converged voice and data have a natural affinity, manifested in the several key areas.

Open Source Linux and VoIP share in common the distinction of having 'come from behind', appearing first as underpowered and indeed under-appreciated technologies. In its decade-long history, Linux incrementally accrued the attributes and capabilities of an enterprise-class OS (and also carrier-class OS), overcoming its initial technical shortcomings and the market perception that it was a hobbyist's toy operating system.

VoIP suffered from both the disdain of and even overt discrimination by existing voice carriers (local operators have repeatedly attempted to block voice services over their captive ISP channels).

Technically, VoIP has faced the vagaries of available IP bandwidth, limited QoS guarantees, and multiple incompatible working standards and implementations. In the last few years, however, both Linux and VoIP have shrugged off their limiting legacies and emerged as mainstream technologies that meet business critical needs.

Both Linux and VoIP are thriving in open, standards-based and community-driven environments. This openness and the resultant interoperability have served to make both technologies ubiquitous, and also to allow business to rethink product and services strategy. By letting OEMs build on COTS hardware, readily-available networking components, and royalty-free software deployment, Open Source Linux has lowered the barriers to entry into the communications supply chain and has thereby fomented the creation of myriad intelligent client devices (especially in Asia). Similarly, by leveraging standards like TCP/IP and SIP, VoIP continues the dismantling of regional and national carrier/operator monopolies, giving rise to new business models and opportunities for provision of voice/data services, supply of IP voice devices, and cost reductions from a more competitive marketplace.

The result is that businesses of all types can enjoy more timely access to new communications services, at lower cost.

Deploying VoIP and Linux together

Beyond historical and business synergies, it is also worth examining the state of co-deployment – how well do Linux and VoIP play together? The short answer is "very well" and getting even better.

Ubiquitous IP networking emerged from that other Open Source OS – BSD UNIX. Early on in Linux evolution, its developers adopted a version of the popular Berkeley TCP/IP stack, whose copyright license is compatible with the GPL. Today, Linux TCP/IP code retains much in common with BSD and implements the Berkeley sockets paradigm and APIs. However, Linux TCP/IP has evolved in its own right into a high performance networking resource whose throughput and stability meet the needs of a range of digital voice applications.

Building on this strong Linux IP base, VoIP leaders like Avaya have standardized on Linux for infrastructure and client software architectures. "VoIP offers organizations the opportunity to integrate voice communications into business processes," comments commented Carl Baptiste, VP of product management at Avaya. "In order to be effective in this integration, communications must follow IT trends, linking VoIP naturally to Linux."

In this same vein, dozens of communications device and systems manufacturers are basing their VoIP product lines on Linux as well. Notable among these are NTT DoCoMo, whose N900 and P900 3G mobile handsets support VoIP over available wireless LANs NexGen City's VoIP phone, and others. On the infrastructure side, TEMs and NEPs including Alcatel, NEC, Nokia Networks, Siemens, and a dozen others are shipping access, gateway, management and other communications servers built on Linux.

Intelligent embedded devices also leverage the synergy between Linux and VoIP. For new converged voice/data device designs, developers can look to American Arium, Arcturus, Freescale, Gao Research, Global IP Sound, Hughes Networks, Intel, Intoto, Movial, Peersec Networks, Radvision, Renesas, Sangoma, Softfront, Softwink, Trinity Convergence, and others who provide reference platforms, protocol stacks, development tools and other software for VoIP/SIP on Linux.

On the desktop, Linux and VoIP also play well together. Considering that IDC and others peg Linux desktop market share for 2005 at under 5%, the actual amount of available software-based VoIP on Linux workstations is quite impressive.

VoIP/SIP service customers can leverage software from the Aethera, IHearU, and Kphone projects, Scype, SJLabs and many others. Server-side, soft PBX software for Linux is also readily available for corporate deployment from companies like Brekeke Software and Facetcorp, and of course from the Open Source Asterisk project.

On one hand, VoIP has enjoyed rapid adoption because it builds on existing IP network infrastructure and on-going build out. On the other hand, VoIP expansion has been squeezed by bottlenecks in the form of performance issues, reliability, standards compliance and interoperability. To facilitate the build out of convergent voice and data, starting in 2000 global TEMs and NEPs joined forces with platform providers to form the OSDL Carrier Grade Linux (CGL) working groups. Since then, the Carrier Grade Linux Requirements Speci-

fication has undergone several revisions to meet OSDL members' evolving needs and in January of 2005 the latest 3.0 version was published. Specifically, the CGL requirements cover availability, serviceability, performance, standards, hardware support, security and clustering.

To date, half a dozen Linux platform providers have shipped or announced distributions and platform products that implement the CGL 1.1 or 2.0 specification, including Mandriva (Conectiva/Mandrake), SuSE, HP (with Debian), MontaVista Software, Red Hat, TimeSys, TurboLinux and Wind River (next version of PNELE). Their customers – global TEMs and NEPs – are today shipping dozens of converged voice and data systems to support carrier applications. These equipment suppliers include Alcatel, Agilent UK, Cisco, Datang, Deutsch Telecom, Ericsson, Fujitsu, Hwawei, Iskratel, Lucent, NEC, Nokia, NTT, Samsung and Siemens.

On both infrastructure and client applications, the introduction and subsequent widespread adoption of the version 2.6 Linux kernel has also buoyed VoIP solution providers. Key VoIP enablers, like IPv6, native real-time, enhanced multi-threading, expanded CPU support, high resolution timers and finer grained system clocks, and other capabilities predicated by the Carrier Grade Linux specification, are integral to the 2.6 feature set.

Perhaps the most important attribute in common of Open Source Linux and of VoIP comes from disruption of traditional (and sometimes stifling) value chains. Both enterprise platform software and traditional voice services in the past went to market as part of tightly and vertically integrated product and services deliverables: organizations acquired their data center (and workstation) software from branded hardware vendors and integrators whose value-added integration and services tended to lock-in customers to particular architectures and technologies.

Voice hardware and services offerings (after the breakup of national PTTs) were somewhat more interoperable among suppliers, but still obliged end-users to make uncomfortable commitments through incompatibilities in equipment and protocols. In both arenas, the dominant business models were vertically integrated and thereby top-down in nature.

Both Linux and VoIP decouple hardware and software requirements, and in doing so, empower end-users, large and small. With Open Source and Linux, IT managers have significantly broader choice among hardware architectures and both hardware and software suppliers. With VoIP, enterprise, SMB and even home end-users finally have the freedom to choose from a range of equipment and services providers.

Both technologies strip bare the pretense of value-added that accompanies vertical integration; they force suppliers to differentiate in terms of features, service and pricing that suit real customer needs, not just supplier marketing programs. Moreover, Linux and VoIP give end users the option of eschewing many legacy supplier relationships; VoIP and Linux present for the first time true multi-vendor ecosystems, and also new options for customers to 'roll their own' solutions with nominal incremental investment in IT expertise.

Bill Weinberg, is Open Source Architecture Specialist for Open Source Development Labs.

The Open Source Development Labs

The OSDL is home to Linus Torvalds, the creator of Linux and is dedicated to accelerating the growth and adoption of Linux in the enterprise. Founded in 2000 and supported by a global consortium of IT industry leaders, OSDL is a non-profit organization that provides state-of-the-art computing and test facilities in the United States and Japan available to developers around the world. OSDL's founding members are IBM, HP, CA, Intel, and NEC.

Recently Korea's Electronics and Telecommunications Research Institute (ETRI) signed up to participate in the Lab's Carrier Grade Linux (CGL) and Data Center Linux (DCL) working groups as OSDL's first Korean member. ETRI is at the forefront of Linux innovation and adoption in Asia, one of the world's hotspots for open source software activity. In April of 2004, the governments of Korea, Japan, and China agreed to cooperate on the promotion of Linux as an alternative to currently used operating systems and formed the Open Source Software (OSS) Promotion Forum. According to technology analyst firm IDC, Linux software revenue in the Asian market outside of Japan will increase at a compound annual growth rate of 82.5 percent between 2004 and 2008, with revenue leaping 78.6 percent in 2005 alone.

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