The telecommunications application ready platform

By Dr. Asif Naseem

Historically Telecom Equipment Manufacturers (TEMs) have relied on in-house resources to develop carrier grade systems for hosting telecom applications. Developing such a system consisted of a complete vertically integrated system comprising hardware, operating system, middleware, and the carrier applications, with most, if not all, implemented as proprietary components. As the computer industry matured in the 1990s, TEMs started to replace the proprietary platforms with commercial hardware running proprietary operating systems. Even though this unburdened the TEMS from investing in developing proprietary hardware, the middleware and the applications remained proprietary in-house developments.

In the current decade, with fewer resources, mounting cost pressures, and shrinking time to revenue intervals, such proprietary approaches are becoming less and less viable. And TEMs – large and small – are looking to acquire Commercial Off-The-Shelf (COTS) components to put together highly reliable platforms that are application ready. With the increasing adoption of standards such as AdvancedTCA, Carrier Grade Linux, Hardware Platform Interface Specification (HPI), and Application Interface Specification (AIS) from Service Availability Forum (SA Forum), creating such a system using COTS components is quickly becoming a viable and cost effective option. Dr. Naseem describes an approach to building a highly reliable application ready platform using standards-based, pretested COTS elements. Also addressed is how this approach effectively reduces the project costs, schedule risks, and time to market/revenue.

The telecommunications industry appears to be emerging from the slump – sometimes referred to as the "nuclear winter" – of the last several years. Even though a far cry from the spending and expansion of the 1990s, some recent reports indicate that telecom spending has started to see an upward tick and that this trend is likely to continue for the near future. One of the more optimistic reports comes from the Telecommunications Industry Association (TIA), which projects a year over year average growth of 9.5 percent for the next three years. Other reports are not as optimistic, placing the spending for the foreseeable future at flat to declining. Without quibbling with the specific numbers, a closer look reveals that both points of view are probably correct. The optimistic growth expectations come from players addressing the emerging and possibly most promising market sectors such as VoIP, wireless, broadband access, and converged services. The growth prospects for the more traditional telecom players are likely to languish while they transition from legacy telephony services to new and converged services. Such transition presents significant challenges for Service Providers (SPs) and TEMs alike. Yet the growth prospects for anyone (new entrants, SPs, and TEMs) aggressively pursuing converged services and the like are not a given. Several challenges must be addressed head on to ensure success in the market.

TEMs' revenues are directly related to SPs' spending on telecom gear. SPs' requirements are putting enormous pressure on TEMs to produce new functionality, reduce cost, and shorten time to market. Adding to the challenges is the need for TEMs to evaluate, and possibly adapt to, new emerging technologies necessary to meet such requirements. Mix into that equation fewer precious resources now at their disposal, and you have TEMs that are faced with unprecedented challenges to meet customer expectations and their own profitability goals.

Key challenges

Let us examine some of the key challenges faced by the players in the telecommunication market.

Price erosion

According to most accounts, the wireless equipment market is at best flat, if not declining. To protect profitability and return on investment, the service providers continue to focus on reducing their capital expenditures. Furthermore, consolidation is resulting in fewer service providers with increased buying leverage over TEMs, their suppliers. As a result TEMs are faced with mounting price pressures. For example, a network element that fetched an average selling price of $60K two years ago is drawing less than half that price in 2005. This trend is not likely to slow down. Service providers are demanding ever-increasing functionality and performance at decreasing prices.

Some of the fastest growth in wireless adoption is happening in the emerging markets, most notably in India and China. As a matter of fact in 2004 wireless subscribers in both countries surpassed wireline subscribers. The penetration in both regions is still pretty low – less than 10 percent teledensity in India – presenting good growth opportunities for equipment providers, including for US TEMs that sell telecom gear to the local SPs. The continued subscriber growth is due to the fact that the Revenue Per Minute (RPM) in these countries is among the lowest, if not the lowest – approximately $.04 per minute. Prepaid service is also keeping the tariffs low. The resulting Average Revenue Per User (ARPU) is $11 and $10 in India and China, respectively. This compares to an ARPU of $57 in the US, and $40 in Europe.

TEMS must adjust their cost structures to meet such aggressive price pressures.

New sources of revenue

Ever-increasing competition among wireline, wireless, and more recently cable operators has rendered voice and best-effort data services as commodity. Such services generate cash, but not profits.

Thus there is a strong need for service providers to find new sources of revenue. Such services must contribute to a significant increase in service provider ARPU. Bundling voice, data, and video – the so called "triple play" – offers a compelling set of services that holds the promise to increase service provider ARPU by 50-100 percent. This is expected to enable the long talked about IP TV, online gaming, distance learning, and a whole set of new applications. Even though the triple play presents compelling opportunities for service providers and TEMs, the reality is that telecom service providers have little experience delivering content as compared with the cable or satellite providers who have been in the business of delivering multimedia content for a long time. However, there is a window of opportunity, perhaps short, in which service providers must successfully deploy technologies to deliver such services before consumers and businesses make their purchase decisions to go with cable and satellite providers. The encouraging news for telecom service providers, however, is that commercially viable technology is available today to deliver triple play services over the carrier infrastructure. Any player who can successfully provide triple play combined with mobility as a bundled service to the end user stands to significantly benefit from it. The challenge for service providers and TEMs is timely execution.

New platforms and technologies

In order to transition from commodity services to new revenue generating services, network operators must upgrade their legacy networks to equipment that can effectively deliver such services. TEMs must respond to operator needs at unprecedented speed and cost. This requires adapting to new and emerging technologies and standards, as well as pursuing development strategies that minimize the risk of missing crucial market windows, yet deliver these new services. The telecom world is slowly, but surely, moving away from proprietary systems to systems based on standards that allow TEMs to build telecom systems using commercially available standard components. The challenge for TEMs is to decide where their core value-add is, and where they can rely on partners and suppliers to deliver components that will allow them to quickly build systems that address their customers' service, cost, and time-to-market requirements.

This is not a short term or temporary situation. These challenges will continue to define the telecom environment for the foreseeable future.

Emerging trends

Service providers generate revenue from applications and services running on systems generally provided by the TEMs. Conceptually (Figure 1) such a system can be viewed as consisting of four different layers:

- Hardware
- Operating system
- Middleware
- Application(s)

The bottom three layers typically represent a platform that must be acquired or developed before end user applications and services can be developed and deployed.

Implementing platforms using proprietary hardware and middleware often involves investment of enormous effort and resources. These proprietary implementations frequently require significant rework each time TEMs introduce a change in any of the layers, rendering the reuse of most of the functionality layers very costly, time consuming, and often prohibitive. Historically TEMs had to build such proprietary platforms in-house due to the lack of standards-based sophisticated, pretested, and pre-integrated COTS components that met their requirements. Such projects have invariably faced many challenges:

- Long development and integration cycles involved with building proprietary functionality and integration of third-party, and sometimes legacy, components
- Product commercialization cycles that are measured in years rather than months
- Missed deadlines due to underestimated development and integration effort
- Lost revenue and/or market share due to being late to the market

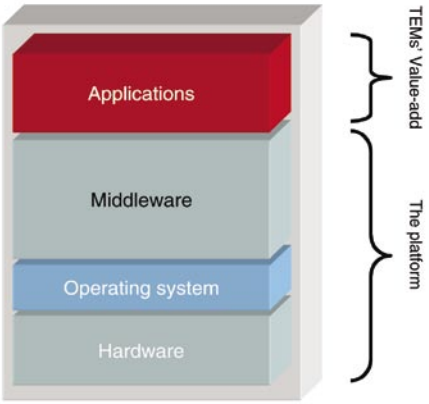

Figure 1

In the last few years, however, a few market realities have been causing systems developers to rethink their strategies. First, tight budgets, aggressive time-to-market requirements, increasing cost pressures, and fewer precious resources are causing telecom equipment manufacturers to look for alternatives such as acquiring hardware and middleware from third parties. TEMS are also focusing their resources on their core competencies, developing revenue-generating applications. Second, several emerging standards are providing designers the flexibility to build systems by combining a set of interoperable COTS building blocks such as hardware platform, operating system, and middleware from a variety of competing vendors. Let us look at the trends and opportunities in each of these layers.

The hardware

Arguably one of the most important factors driving the standardization of the hardware layer is the advent of the AdvancedTCA standard. A natural evolution of the PCI Industrial Computer Manufacturers Group (PICMG) specifications, AdvancedTCA is the first open standard targeted primarily at developers of telecommunication systems. It provides specifications for creating carrier grade hardware architecture that specifically addresses the reliability, performance, and scalability required for telecommunication applications. AdvancedTCA is fast gaining industry traction and most major TEMs have already announced their plans to provide network elements based on this standard. Although revenue estimates vary widely – 2007 revenue of $4B to $20B by RHK, and CCC/Metz International, respectively – there is no argument about

the significant traction this standard is gaining with the OEMs. According to a report by In-Stat/MDR[1], by 2008 15 percent of the total chassis capital expenditure planned by the TEMs will be spent on chassis based on industry standards.

Another important development that holds additional promise for helping to drive this layer to standardization is the hardware abstraction specification called Hardware Platform Interface (HPI) specification from the SA Forum. HPI specifies services which, when implemented by the hardware OEM, provide ease of integration with third-party middleware that is compliant with the HPI specification. Commercial implementations of HPI are currently shipping from different hardware vendors. Middleware products that make use of HPI services are also commercially available.

Standards-based hardware promises to provide significant cost savings to the TEMs, savings that can be passed on to their customers, the service providers. A key implication of standardizing this layer is that it shifts the TEMs' value-add upwards into the software layers where it rightly belongs.

The operating system

Carrier Grade Linux (CGL) is fast gaining significant traction with TEMs developing a variety of new elements for the network core as well the edge. An impressive number of TEMs are already delivering systems based on CGL. On the operating systems and tools front, Wind River has recently joined MontaVista and Red Hat in announcing support for CGL.

Helping things along is the Open Source Development Lab (OSDL), an industry body dedicated to accelerating the adoption of Linux for enterprise computing and carrier applications. The CGL Working Group of OSDL is defining feature road maps and specifications for use in telecommunications architectures.

The middleware

Middleware is the natural next step in moving up the standardization chain. Ideally if this layer can provide abstraction from the layers below as well as the layer above it, the benefits to TEMS are potentially enormous. They can focus on their primary value add – the telecommunication services – without having to worry about the underlying middleware. Such standardization, though in its infancy, has already begun. SA Forum is leading the effort to create sets of standard specifications that facilitate middleware vendors to write their software such that they conform to standard APIs at the hardware as well as the application layer. In addition to HPI, it is evolving another specification called the Application Interface Specification (AIS), which establishes an interface between middleware components and the application layer. These specifications are intended to facilitate portability of middleware and applications across multiple platforms, thus reducing the startup cost and the integration effort. Several middleware vendors have announced support for AIS. Such vendors include those developing and marketing middleware that addresses areas such as high availability, systems management, and databases.

Several large players have been promoting standards-based modular platform architectures that provide for integration with COTS pretested middleware components. HP's Advanced Open Telecom Platform (AOTP), Intel's Modular Communications Platform, and IBM's BladeCenterT are some of the recent examples promoting the COTS-based ecosystem that such standardization makes possible.

The application

This is the layer of most value to the service providers in that applications are what generate service revenues for the service providers. The bottom three layers shown in Figure 1 can be viewed as the enabling technologies that support the applications and resulting services provided by the application layer. This is where the TEMs have the most opportunity to competitively differentiate themselves by offering compelling services that meet or exceed their customers' requirements.

It follows that the TEMs are best served if they can minimize their cost and effort in the lower layers by acquiring COTS components to put together an *application ready platform* rather than developing one in-house using proprietary technologies. This approach lets them focus their precious resources on developing the layer that provides them the most value and the most competitive differentiation, the application layer. This is where their core value-add is and should be.

Putting it all together

As some of the key standards, such as AdvancedTCA, CGL, and SA Forum specifications gain increased traction, the COTS ecosystem will continue to mature with more and more players providing pretested, pre-integrated components that can be used by the TEMs to quickly and cost effectively build application ready platforms. The transition from all-proprietary systems to COTS-based systems is expected to accelerate (Figure 2).

Figure 3 shows the *application ready platform* from GoAhead. SelfReliant, workhorse of this platform, provides comprehensive functionality that includes:

- Ability to model the entire system at the node as well as at the network level
- Stateful failure recovery
- Fast distributed messaging
- Standard interfaces for external systems management

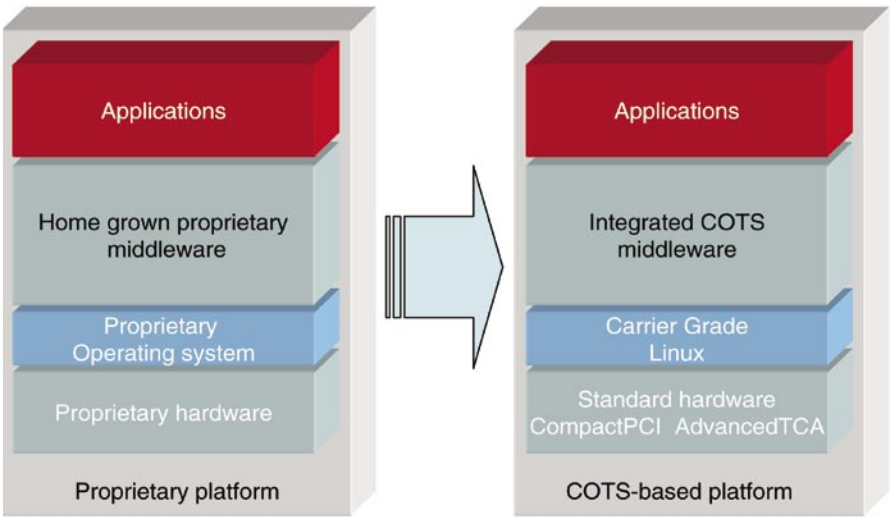

Figure 2

SelfReliant provides integration with relevant third party products from the COTS ecosystem, including widely used middleware components such as in-memory databases, relevant protocol stacks, and storage management systems. SelfReliant also provides seamless integration with standards-based hardware systems, such as CompactPCI and AdvancedTCA, from a variety of hardware vendors. SelfReliant provides such integration through HPI A or HPI B capabilities. By conforming to standards and providing abstraction layers, SelfReliant is platform independent.

SelfReliant has been field tested and proven through four major releases and more than 4000 deployments worldwide.

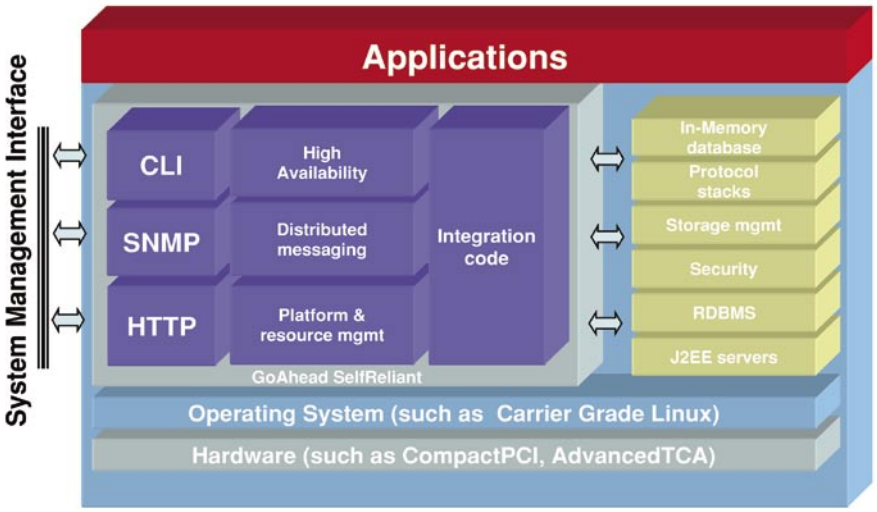

Figure 3

The final word

Mounting cost pressures, shrinking market opportunity windows, fewer development resources, and demand for new services from service providers are making TEMs rethink their system development strategies. They must develop telecom network elements quickly and cost effectively. The emergence of a set of key standards is enabling an ecosystem that offers an unprecedented opportunity for TEMs to build carrier grade systems from COTS components quickly and cost effectively. The transition from proprietary to standards-based systems is shifting the TEMs' value proposition up the stack into software, which creates the most value for them and their customers, the service providers.

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References

[1] "Standardized Chassis Help Thaw The Capex Ice Age," In-stat/MDR, 2004

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