

Meeting the Migration Challenge Operators Respond to the Next Generation

By Juniper Networks (Hong Kong) Ltd.

Revenues from mobile voice services have been dropping for years, challenging operators to either find new revenue streams or be forced out of the game. Against this trend is the continued proliferation of IP technology, changing the basic premises upon which much of the public network infrastructure is founded.

History is Being Repeated

The current situation of mobile operators parallels the transformation of broadband services. Fixed-line operators had to move beyond basic bandwidth provisioning to deliver voice and other enhanced IP-based applications to boost their average revenue per user (ARPU).

For the most part, wireline operators have embraced an IP infrastructure as a unified network that will eventually carry all their traffic. After years of talk, convergence really did happen. But mobile operators have had fewer reasons (until now) to take this tack, given their more controlled mobile technology environment and a relative lack of IP-based competition. But the landscape has changed, with the widespread deployment of mobility-enabled WiFi and WiMAX networks emerging, and the continual migration of 3G standards to support (and, indeed, depend upon) IP as a fundamental component of the network infrastructure.

One major issue facing mobile operators is that the infrastructure to enable the new, advanced services differs significantly from legacy infrastructure. Therefore, to ease the migration, the organizations that drive technical development of mobile carrier specifications (the 3GPP and 3GPP2) have adopted strategies to move the mobile world towards IP in a way that allows providers to deploy new services rapidly, while upgrading network infrastructure more slowly.

迎接遷移挑戰 電訊商對新一代技術的回應

供稿：Juniper Networks (Hong Kong) Ltd.

近年來，流動話音服務的收益不斷遞減，迫使電訊商開拓新的收入來源，以免被淘汰；另一方面，IP科技日趨普及，令很多公共網絡基建的構建基礎出現重大轉變。

歷史正在重演

流動通訊商現時的處境，與寬頻服務轉型時的情況如出一轍。當時固網互聯網服務供應商除了提供基本連線服務外，還要依賴話音和其他經過改良的IP應用，才能提高所獲得的每位用戶平均收益 (ARPU)。

大多固網電訊商都把IP基建部署為一體化網絡，用以傳輸所有流量。數據和話音融合技術一直是業界熱門話題，多年後終於實現；截至目前為止，供應商一直掌握流動技術環境，而且來自IP技術方面的競爭亦未算激烈，令他們不需要積極開拓這些融合服務所帶來的商機。但時移勢易，可配合流動服務的Wi-Fi及WiMAX網絡俯拾皆是，供應商爭相採納3G標準以支援(其實是依賴)IP作為網絡基建的基礎，令情況出現轉變。

流動電訊商面對的一個主要問題，就是新式電訊服務所需的基建，與他們舊有的基建截然不同。因此，推動3GPP和3GPP2流動電訊規格和技術發展的機構為了協助業界順利過渡，已經實行把流動領域推向IP技術的新策略，務求讓電訊商毋須急速升級全部網絡基建，同時可以盡快推出各種全新服務。

純IP網絡內所採用的各種技術標準，基本上是由營運商核心擴展至用戶手機方面，各階段的順序是數據核心、整合網絡、業務平層(service plane)、存取連結，最後是用戶使用的手機或流動設備。

Essentially, the standards for an all-IP network are being propagated from the provider core towards the handset. The incremental stages encompass the data core, the aggregation networks, the service plane, the access linkages, and finally the handset or mobile equipment itself, in that order.

But There's a Twist in the Story

While traditional mobile providers move towards an IP world, non-mobile providers are gearing up to offer wireless access. In many cases, these are broadband providers seeking to compete with mobile providers for the same customers and the same services (such as wireless Internet access and perhaps even wireless IP-based voice). The major advantage the mobile operators still have is the ability to sustain a connection while the user is in motion, handing off the signal to different cellular stations. This still cannot be pragmatically achieved with wireless LANs.

However, aside from the mobility factor, the two networks actually have many similarities. For example, both types of operators (mobile and land-line) are taking advantage of consolidation in the data core to reduce CAPEX and OPEX. It is important for the core to support much more than best-effort data (such as for Web or email access) because it will eventually be responsible for delivering many types of latency-sensitive, real-time network services, including voice and video. The more forward-looking operators understand this need and are preparing for the future by putting in place the infrastructure needed to deliver next-generation services.

Another industry trend resulting from this shift to IP is far greater awareness of network security. Because both the 3GPP and the IEEE standards for wireless data access expose more of the provider infrastructure to users, and to the Internet, there is increased vulnerability. For example, the 3GPP specifications began offering Internet and other simple data access over a set of circuit-based interfaces that closely resembled (and in fact were descended from) the voice interfaces of the public switched telephone network (PSTN). The migration to an IP-based, packet network meant network equipment could be directly attacked by miscreants from both the



然而，情況又出現了意想不到的變化

傳統流動服務營運商逐漸趨向IP化的同時，非流動服務營運商卻整裝待發，預備進軍流動服務市場。不少寬頻服務營運商所提供的服務(包括無線上網或無線IP話音服務)和客戶對象，都與流動服務營運商相同。流動服務營運商仍然享有的主要優勢，就是在各處設有可處理網絡訊號的蜂窩訊號據點，讓用戶外出時仍然可以隨處連線。這是無線區域網現時無法實現的優勢。

但除了這項流動因素外，這兩類網絡其實有許多相似之處。例如兩類服務營運商(流動和固網)均透過數據核心整合來減低前期購置和後期營運成本。網絡核心將用以傳送許多不能有絲毫遲緩的即時網絡服務，例如話音和影像，所以單純的盡力而為(best-effort)式數據傳送技術已經難以滿足用戶的要求。較高瞻遠矚的電訊商明白這個需要，並正建設新的基建以支援新一代服務，為未來發展作好準備。

另一股因遷移至IP技術而掀起的業界趨勢，就是網絡保安意識大幅度提升。無論是3GPP 或IEEE的無線數據存取標準，都增加了服務營運商基建對用戶和互聯網的開放程度，因此提高了被入侵的風險。例如3GPP 規格開始為互聯網和其他簡單的數據存取程序提供一套以線路為基礎的介面，這介面其實是由公共電話網絡(PSTN) 話音介面演變而成，兩者十分相似。電訊商的網絡基建轉變為採用IP技術的封包網絡後，可能會直接遭受來自互聯網和無線流量的惡意入侵，故此電訊商以防火牆、加強認證、VPN及其他改良技術來加強保安，以保護實體網絡架構和敏感的用戶資訊。

從網絡設備的觀點看來，Juniper Networks M320 多重服務路由平台等方案可以把現有的網絡轉變為新一代網絡基礎，透過加入服務質素保障(QoS) 功能及可用性保證等嶄新技術，以提供較低的初次投資及加強可靈活調節規模的遷移能力，為用戶帶來龐大價值。在保安方面，NetScreen 防火牆應用、入侵偵察及預防系統等經過加強的方案均經過仔細調校，能夠應付電訊商對

wireless realm and the Internet. Thus, operators added protection in the form of firewalls, strengthened authentication, more capable VPNs and other security enhancements to protect both the physical infrastructure and sensitive customer information.

From a network equipment point of view, offerings such as the Juniper Networks M320 multiservices routing platform can transform the network core into a next-generation foundation, with QoS and availability guarantees and a low initial investment with a very scalable migration path. In the area of security, enhancements (such as the NetScreen firewall appliances and intrusion detection and prevention systems, which have been fine-tuned to operate within the heavy demands of an operator environment) bolster the network and fend off threats from the brave new world.

While service providers face the complex challenge of “next-generation wireless networks,” the good news is that solutions already exist to make this transformation a success, helping operators to reap the promise of the wireless opportunity without compromising on their basic promise of delivering a connection, no matter where the user might be.

營運環境的極高要求，對抗新領域的威脅及保護網絡安全。

雖然服務營運商面對着「新世代無線網絡」的複雜挑戰，但值得慶幸的是，現時已有方案可以協助他們成功過渡，好讓他們把握無線技術帶來的龐大商機，以及實現讓用戶隨時隨地獲得連線服務的基本承諾。