



Mobile IP

surges across Europe



The new telecom era has unleashed a tide of IP that is advancing across the world through mobile networks. Numerous operators have already started implementing their IP-based network strategies as part of the inevitable trend. Europe represents a region replete with both GSM and WCDMA technologies. It boasts the world's most developed mobile communications' market with a handset penetration rate approaching 110%, and is home to many leading operators including Vodafone, Orange, and Telecom Italia. **What decisions, plans and choices have these operators made with the mobile IP wave surging across Europe?**

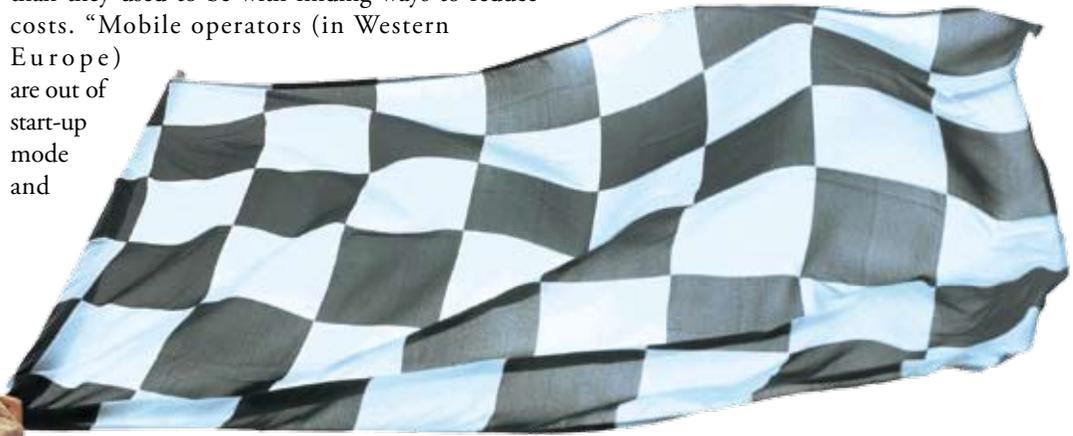
By Liu Zhen

Data services are forming a greater proportion of operators' overall income in the rapidly expanding mobile communications market. However, demands on mobile networks are increasingly stringent due to the evolving diversity and complexity that characterizes services such as mobile video, voice, music, broadband Internet, video conferencing and interactive gaming. Operators must effectively respond to a range of key issues that include identifying how to successfully decrease network construction costs and deployment times while increasing revenue and enhancing network performance.

Richard Deasington, Director of the UK consultancy Network Effect, agrees that as mobile operators mature as enterprises, serving highly penetrated markets, they also become more concerned than they used to be with finding ways to reduce costs. "Mobile operators (in Western Europe) are out of start-up mode and

into the business-as-usual phase. They need to show investors ongoing profit growth. To do that, they need to chip away at the cost side of the equation. Another trend pushing them in that direction is the fact that tariffs are falling, too," he says.

Mobile network IP transformation describes an extremely complex and systematic project that not only demands a decrease in Total Cost of Ownership (TCO) and the construction of end-to-end IP capabilities, but also focuses on service innovations, Quality of Service (QoS) improvements, future-oriented long-term investment protection and cohesive development. The context of these challenges has galvanized Vodafone, Orange and Telecom Italia to orient their practices to promote IP transformation in world mobile networks.



Vodafone extends its leadership

As one of the world's largest operators, Vodafone is bombarded with competition. Crucial measures to guarantee its continued leading position and market expansion are OPEX reductions coupled with a boost in network performance. According to an officer of Vodafone, "An operator must look at the total cost of ownership. At a

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rough calculation, only 30% of the total cost of ownership is directly related to product cost, the remaining 70% has to do with product efficiency, such as cost of installation, maintenance, operations and transmission. It's all about working jointly with the vendor to find more efficient ways to run the network."

Vodafone Spain shining with innovations

Vodafone's headquarters of Wireless is situated in Spain, and Vodafone Spain epitomizes the vitality and key characteristics of Vodafone's success. As one of the group's most outstanding and important subnets, it supports 1.2 million 3G subscribers and occupies 65.33% of the Spanish WCDMA market. Maintaining this market lead is dependent upon guaranteed network performance and a constant service innovation platform that generates sufficient profit levels.

Distributed Node B climbs up towers easily

European network construction engenders two major concerns for operators: environmental protection and TCO reductions. Vodafone Group is of course no exception, and in response to both concerns, Vodafone Spain has adopted Huawei's small and lightweight next-generation Distributed Node Bs for its 3G network.

These smart nodes possess several advantages. Ropes rather than cranes are sufficient to load a remote radio unit (RRU) onto a tower, and the RRU's location near the antenna allows optical fiber connections with the baseband unit (BBU). With feeder loss is decreased, coverage is greatly enhanced,

and site numbers are reduced, great savings are made in network construction costs.

Previously each base station used huge amounts of power to support uninterrupted 24-hour operations, and air conditioners were essential to lower equipment heat. "It's mega-money," says Richard Deasington, referring to the enormous potential for savings that many operators have not yet fully grasped. The Huawei node eliminates the need for air conditioners by supporting natural heat dissipation, and its power amplification technology can utilize green energy forms such as wind, solar and marsh gas. Each Node B can reduce power consumption to below 500W and CO₂ output by 60%.

Statistics demonstrate that since Vodafone Spain employed Huawei's Node Bs to deploy its High-Speed Packet Access (HSPA) network, 30% less investment was required to facilitate a much more environmentally friendly network. The Vodafone officer mentioned above is quick to point out the scale of the financial and environmental impact in the context of thousands of Node Bs. Moreover, Richard Deasington observes that operators can adopt other measures to realize further savings, not least of which is wise vendor selection. He estimates that the operational technology difference between vendors culminates in a cost discrepancy reaching "tens of millions of euros", which is exactly why Huawei proved the right choice for Vodafone.

Lighting up El Gordo

On 22 December 2007, the Spanish Christmas lottery El Gordo ('The Fat One' in English), was as usual announced on schedule in Spain. As usual, Lucy was enjoying a Swiss Christmas vacation with her husband on 22 December. Vacationers like Lucy have become used to browsing Internet news for the numbers, unable to enjoy real-time anticipation,

extremely complex and systematic project that demands IP capabilities, and focuses on service innovations, QoS protection and cohesive development. The context of these practice to promote IP transformation.

“Even if I don’t win, it’s still a real disappointment not being able to enjoy the live experience on TV.”

Developing from a small sweepstake in southern Spain dating back 200 years, it was gradually popularized to the rest of the country and now forms a Christmas tradition worth USD1.7 billion. Due to its attractive probability, over 70% of the nation’s 40 million population buy tickets - which are also available in the U.K. - and pin their hopes on the fall of El Gordo’s 150 year-old lottery balls.

The draw, which lasts 3 hours and forms a prime slot on national TV to which most Spaniards tune in, has not historically been broadcast on mobile TV due to poor network conditions. However, 2007 marked the first year when people like Lucy joined in with the Spanish festivities in real time.

After selecting Huawei for holistic network construction in June 2006, Vodafone Spain recorded a 30% improvement in network performance subsequent to scheme completion, and this laid a platform for quick mobile TV service deployment. Providing 10 digital channels for Vodafone Live’s 3G subscribers including El Gordo, travelers no longer have any problems accessing the Spanish shows that are important to them.

Winning in HSDPA benchmarking test

In May 2007, Vodafone Spain conducted a test to compare its high speed downlink packet access (HSDPA) benchmark with

those of other operators. The test result illustrated that the HSDPA throughput enabled by Vodafone Spain in its 29 coverage areas was unsatisfied - in these areas Vodafone had adopted other vendors’ wireless equipment to achieve network coverage.

Shocked by the result, Vodafone Spain’s technical staff anxiously consulted Huawei, and the two partners selected eight hotspot areas in Madrid to be covered by Huawei’s wireless network. The new network was then put to the same HSDPA test as before, and then optimized. The results exhibited an HSDPA with far greater stability and with a throughput that exceeded other operators’ by over 30% on average. Furthermore, after optimization, single-site HSDPA throughput was significantly improved. In the HSDPA benchmarking test that followed, Huawei received high recognition from Vodafone Spain.

Vodafone Iceland covering 120km of seas

Located near the Arctic Circle, Iceland sits on the westernmost tip of Europe in the middle of the North Atlantic. Being the second largest European island, Iceland has a 4,970km coast line and an economy that is underpinned by fishing. The numerous of boats leaving shore each day necessitates high-level sea-based as well as land-based network coverage.

Jack represents a typical Icelandic fisherman who attaches great importance to high-quality offshore communications. In the past, these were inadequate, and while at

sea, Jack and his fellow fishermen frequently lost contact with the people onshore. “Seeking help was impossible if we were caught in a storm,” recalls Jack, whose family could do nothing but worry for his safety during his days and nights at sea.

Responding to Iceland’s special landform, Huawei proposed a solution that sought to perfect offshore communications and enhance 120km of sea coverage. In May 2007, Huawei began reconstructing Vodafone Iceland’s GSM network. By using the dual-timeslot extended cell scheme and effectively combining its power enhancement, transmission diversity, and 4-way receiver diversity functions, the system has achieved downlink gains and higher receiver sensitivity. As a result, the receiver function is now directionally balanced for both uplinks and downlinks. What’s more, Huawei took advantage of the nation’s unique landform for high terrain sites and mounted antennas at suitable points to expand sea coverage. Consequently, system coverage radius was increased by 20% and the total coverage area by at least 40%. The number of sites was proportionally reduced by 30%, which both curtailed investment and facilitated greater environmental protection.

Since the project’s inception, the key performance indexes (KPIs) of Vodafone Iceland’s network have all improved considerably. Network quality, subscriber experience, customer satisfaction and offshore traffic have all been greatly enhanced, ensuring that Jack and his fellow fisherman can benefit from the greater safety that effective communications deliver.

Table 1 Vodafone’s UMTS/HSPA network

	Download	Upload
Total data transferred	148.90MB	8.29MB
Max. transfer rate	4.65MB/s	0.42MB/s
Average transfer rate	1.74MB/s	0.10MB/s

Table 2 Other operators’ UMTS/HSPA networks

	Download	Upload
Total data transferred	148.90MB	8.29MB
Max. transfer rate	2.06MB/s	0.25MB/s
Average transfer rate	266.6KB/s	24.4KB/s



GO, GO, GO!

Orange opens up the Belgian Grand Prix

In addition to other regions, Orange operates in 22 European countries and serves nearly 85 million mobile subscribers. Regarded as the most capable European operator in R&D terms, the company boasts 16 research institutes around the globe. Positioned as a leading European mobile operator, Orange has remained dedicated to developing new services and solutions to perpetuate its stature across the industry. The company has also been searching for a long-term strategic partner to help reduce its TCO and increase its operational revenue, and a strategic choice came to fruition with the Belgian Grand Prix.

Sharing excitement on the Spa-Francorchamps circuit

“GO, GO, GO KIMI!” On September 16, 2007, the Belgian Formula 1 Grand Prix began in Spa-Francorchamps amidst a flurry of deafening screams and shouts and

a sea of mobile phone activity as countless fans made video calls to share their excitement, while reporters from all over the world took full advantage of the HSPA network to cover the race.

The Spa-Francorchamps circuit is located in the center of Belgium and has been the venue for the Belgian Grand Prix since 1985. The 6.973-kilometer circuit is the sport’s longest, and is generally regarded as the leading world venue and home to the best races. Tracing the uneven contours of a hill, the circuit is considered to be one of the most challenging Grand Prix circuits, the downhill run providing an especially breathtaking stretch. The rugged terrain has always hindered network coverage and high-speed mobile data services have remained unfeasible, representing a disappointment to the legion of fans wishing to record the action.

In April 2007, Huawei began deploying Distributed Node Bs in Belgium having

fully considered the topographical variations among different spots in the circuit and landform complexity. Huawei proceeded to implement its wireless network planning solution and antennas based on existing sites surveys in a move to significantly save the operator, Orange, network construction costs by utilizing current equipment rooms, site equipment and antennas. IP and multi-carrier technologies were introduced to Orange’s network so as to enable end-to-end IP networking from the interior to the exterior, while greatly improving the system’s bandwidth throughput capability.

After network reconstruction, Orange was able to provide subscribers with a rich and flexible service experience that included mobile broadband services, VoIP and mobile TV. The communications network covering the Spa-Francorchamps circuit has remained as a permanent fixture that will benefit legions of fans and reporters for years to come.

Telecom Italia: higher speeds and newer experiences

Telecom Italia is the seventh largest operator in the world and is famous for its innovation. It plays a dominant role in its domestic market, and operates in numerous European and Latin American regions including Germany, France, Holland, Brazil, Argentina, Bolivia and Cuba. Having already secured nearly 30 million fixed and 60 million mobile subscribers, the company is seeking to expand its activities by investing EUR14 billion between 2006 and 2008.

The constant development of the mobile communications industry has necessitated continual base station adjustment in Telecom Italia's existing network. Essential upgrades for HSPA and IP radio access networks (RAN) increase costs and endanger network performance. Telecom Italia expects to strengthen its position by providing a new network while decreasing capital expenditure (CAPEX) to meet the fast growing requirements for 3G network capacity and the demand for the rapid inception of new services. Huawei's next-generation Node B solution and its associated business model are designed to save millions of euros in network adjustment areas, and as such attracted Telecom Italia's interest.

Mobile experiences on high-speed railways

By 2008, Italy will deploy over 1,000km of high-speed railway track, with the Rome-Naples and Milan-Turin stretches already up and running. The highest train speeds reach 300km per hour and, in response to the public need for high-speed Internet services while in transit, Telecom Italia has planned to launch its high-speed Internet service in partnership with the railway company. HSDPA technology is adopted for back transmission through which data is converted to Wi-Fi signals to facilitate the Internet and other high-speed data services.

On a high-speed railway, call traffic is concentrated in moving carriages, and solution design in terms of construction costs and high-speed performance should be considered, especially technical difficulties brought about by Doppler frequency shifts at high speeds. Huawei's unique 40W power amplifier enables bi-directional divided linear coverage. Its unique high speed algorithm can overcome influences from both the Doppler effect





and excessive cell handovers. Multi-RRU combination technology can improve HSDPA performance, and BBU pool technology can reduce BBU numbers and thus construction costs.

To date, Huawei has completed the solution design and network planning for the trial section of the Rome-Naples high-speed railway. In the near future, subscribers can conveniently use high-speed Internet services on trains between Rome and Naples with the same results as office use.

Romantic, golden holidays in Sicily

Sicily provided the scenic backdrop for the award-winning movie *Malena*, and is widely regarded by both ordinary tourists and celebrities as a romantic island and desirable get-away location. July and August represent its peak-season months during which tens of thousands of tourists descend on the island to enjoy the sunshine, the beach and the island's rich history.

For Telecom Italia, the clusters of tourists bring about huge business opportunities as the more diligent tourists utilize the HSPA network to keep up with their business tasks, while others use their mobile phones to send photos or videos to relatives and friends. Telecom Italia's existing network, however, fails

to meet modern requirements and it is almost impossible for subscribers to use high-speed mobile data services in Sicily, thus prompting the drive for network enhancement.

Guided by the premise of high-quality but low-cost customer solutions, Huawei fully employed Telecom Italia's existing resources while ensuring high quality integrity. Including towers, equipment rooms, power supply systems and transmission equipment, reuse has saved Telecom Italia much investment during the network reconstruction process. In terms of performance, the download rate of Sicily's HSDPA network gradually increased from 1.8 to 7.2 Mbps, and more importantly, the network was adjusted before the 2007 peak season. The KPIs have demonstrably improved, and problems concerning network congestion and poor indoor coverage have been completely eliminated. Network quality has been optimized and improved, as enhanced customer satisfaction and rapidly increasing traffic rates testify. The new network is based on full-rate HSPA technology and enables Telecom Italia to deploy new services. Not only do greater number of subscribers now use Telecom Italia's services during their stay in Sicily, but also the increased average revenue per user (ARPU) reflects a positive gain for Telecom Italia. 

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