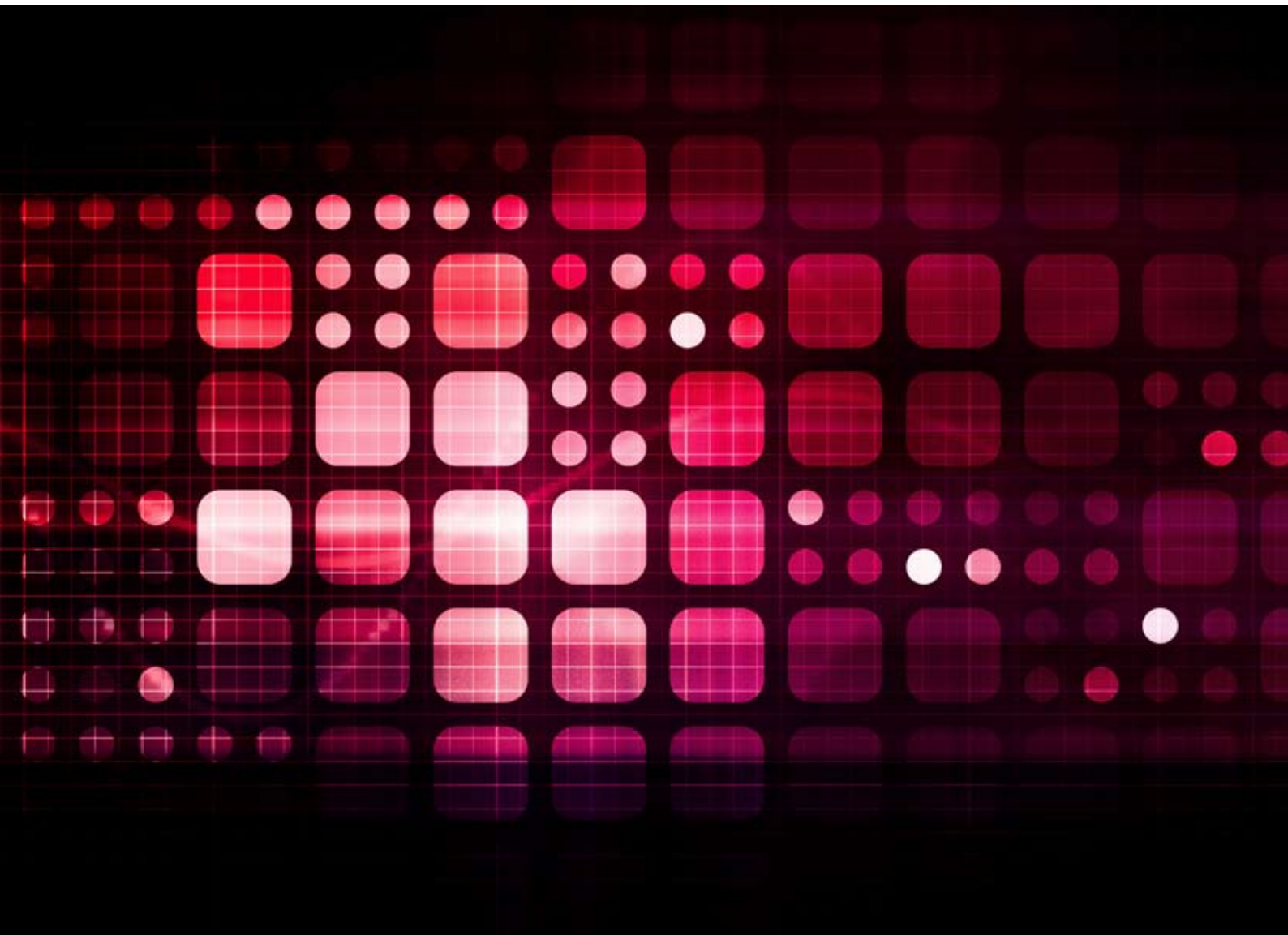
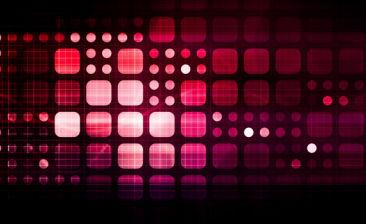


# Saving mobile broadband

## '4G' first movers: network and pricing strategies

A summary of the main report from the Economist Intelligence Unit





## Executive summary

**LTE**, or Long Term Evolution, has become a top priority for many mobile network operators (MNOs). Promising much faster speeds and greater capacity than their current crop of network technologies, LTE could well be the shot in the arm that MNOs need. And a boost is urgently required.

Regulatory and competitive pressures have dragged down the price of voice calls and texting, once the mainstay of the mobile-phone business. A boom in smartphone sales and 3G data plans has helped cushion the revenue drop, at least in developed markets, but that has come at a price. Networks using third-generation (3G) technology, the most advanced before the arrival of LTE, are clogging up. Smartphone users like to browse the internet, share photos, download music and watch video clips, but that has sent mobile-data volumes soaring. 3G is struggling to cope.

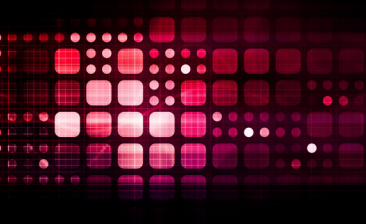
To prevent network performance from deteriorating, which risks upsetting high-spending smartphone customers, MNOs have had to invest heavily in 3G upgrades. For many, however, that is only a stop-gap solution. To provide extra capacity and faster speeds in a more efficient way, operators are increasingly taking the view that they should overhaul their networks to support LTE. They like to call it '4G'.

National governments and regulators are also keen. There is evidence of a link between higher national GDP and better-performing, widely available mobile broadband networks. If 3G is becoming congested, then regulators can help to ease the strain by releasing more spectrum (the wireless frequencies over which voice and data signals travel). That spectrum can then be used for '4G'.

Certainly, there are more wireless frequencies to go around. In Europe and Asia, 'digital dividend' spectrum (800MHz) is being freed up as broadcasters switch from analogue to digital TV. At a global level, the International Telecommunications Union (ITU), a standards body, has identified the 2.6GHz frequency band for mobile broadband use. The prospect that more spectrum will be released, plus a need to revamp mobile-phone business models, augurs well for LTE.

## Opportunities and threats

The arrival of new technology, however, entails risks as well as opportunities. Not every operator will gain in equal measure, and some may even lose out. To understand this better, the Economist Intelligence Unit has analysed the '4G' positioning of eight operators, spread across three continents, that have already launched commercial services: two from North America (AT&T and Verizon Wireless); two from Asia (CSL in Hong Kong and South Korea's SK Telecom); and four from Europe (A1 in Austria,



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Tele2 Sweden, Telekom Deutschland and Telia Sweden). For each of these operators, this report contains a detailed case study.

The senior executives<sup>1</sup> with whom the Economist Intelligence Unit spoke are generally optimistic about the '4G' opportunity. There are no concerns about LTE network performance, and the prices of radio equipment are relatively low when compared with the payments originally made for 3G networks. What's more, operators can lower their overall costs by replacing their older 3G base stations with equipment that can simultaneously support upgraded versions of 3G and LTE. If 2G is added to the mix, the economics of this become even more appealing. Because most operators still serve many customers using 2G-only phones for voice calls and texting, they will have to maintain a 2G service for some time.

"The cost of modernising our 3G network is no more expensive if we roll out base stations that can also support 2G and 4G," says Tommy Ljunggren, managing director of mobile networks for the TeliaSonera Group. "In that sense, 4G is free. Though multi-radio base stations support more frequencies, they use less power than older base stations. Power is a large portion of the opex right now, as is site rental."

There is also optimism, particularly among European operators, that customers will value the faster '4G' speeds and dig deeper into their pockets to pay for them. Integrated operators (those with mobile and fixed networks) also look well positioned to develop bundled packages that differentiate them from smaller rivals. And all operators featured in our report say they are confident that LTE will open the door to new services. Online gaming, high-definition videoconferencing and mobile cloud computing have all been flagged up as promising opportunities.

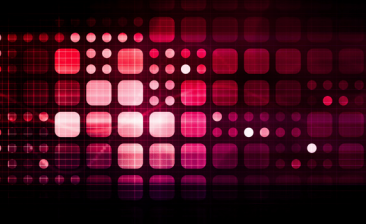
### Risky business

But there is plenty for senior executives to worry about. Anxiety over spectrum, and how it gets distributed, is widespread. In countries where spectrum is yet to be auctioned, tension is high. In Austria, where an 800MHz auction is scheduled for the first quarter of 2012, A1 fears it may not receive enough spectrum to run a high-capacity LTE network. "We might have to consider network sharing if we get only a small chunk of spectrum," says Walter Goldenits, the firm's chief technology officer. In such an event, A1's strategy of differentiating itself through better network performance would be compromised.

Spectrum is one of the most divisive issues in the mobile-phone industry. It helps to explain why only 13 countries have auctioned 2.6GHz so far. Progress at 800MHz has been slower still. Germany became the first country in the European Union (EU) to auction 800MHz in May 2010, but there has been no domino effect. Only Sweden, Spain and Italy have put digital dividend spectrum under the hammer since the German auction.

Disputes between regulators and MNOs have slowed down progress. A vexing issue has been how to deal with MNOs' existing '2G' spectrum assets in the 900MHz and 1800MHz bands, traditionally used for voice calls and text messages. The European Commission has urged national regulators in the EU to allow the re-farming of 2G spectrum for 3G and 4G, but this worries MNOs that hold less 2G

<sup>1</sup> Out of the eight operators for which there are detailed case studies, only Verizon Wireless did not contribute to this report.



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spectrum than their domestic rivals. They typically argue that a green light for re-farming, without a re-distribution of 2G spectrum first, would be unfair.

Obliging winners of 800MHz spectrum to roll out '4G' to less profitable rural areas, and so narrow national 'digital divides', can also put a strain on the LTE business case. Many operators are uneasy.

Another headache is how to maximise the LTE data roaming opportunity. Although the ITU has identified 2.6GHz as a global frequency band for mobile broadband, there are doubts it will be suitable for inter-continental roaming. "2.6GHz is excellent for Europe, but probably only for main cities," says Mr Ljunggren. "It is questionable whether 2.6GHz would be rolled out on a more global scale, particularly in the US, where the focus is on 700MHz. 1800MHz [a 2G frequency band] may be better from a European and Asian perspective, but that still leaves the US out." Mr Ljunggren says he is lost for an answer.

Happy though operators may be with equipment performance, another concern is the lack of reliable LTE devices. CSL, for example, offers only one USB dongle to its '4G' customers, as does the TeliaSonera Group. Manufacturers have been slow to supply devices that support LTE on the multiple frequency bands operators require. "The biggest problem for us is getting a range of devices at reasonable prices," continues Mr Ljunggren. That problem will only ease when more operators launch LTE services with the same frequency band requirements. This will then drive greater economies of scale.

### Where are the LTE smartphones?

LTE-enabled smartphones will be needed if '4G' is to become a mass-market service. They have yet to arrive in Europe, and the region's operators do not expect to see them until the first quarter of 2012 at the earliest. In the US and Asia, however, some LTE smartphones are already available. Verizon Wireless in the US has the most varied LTE smartphone portfolio in the world, offering eight smartphones from five different device manufacturers.

Support for Verizon Wireless, however, does not benefit other LTE operators that would like to order smartphones. The US operator uses a different 3G standard (based on CDMA) from operators in Europe and most of Asia, and so its dual-mode 3G/LTE devices will not work on other 3G networks.

### Diverse strategies

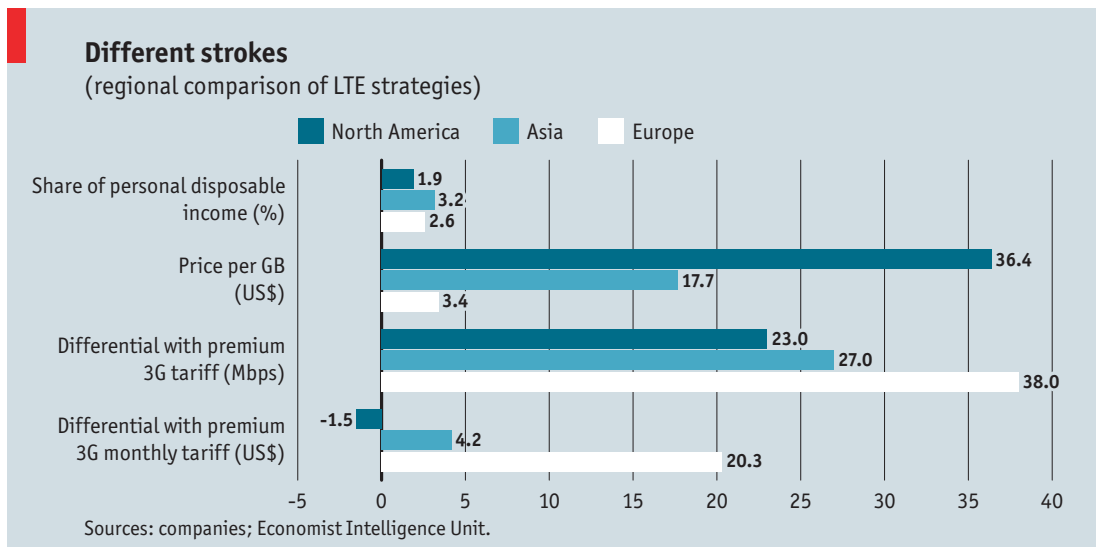
Though operators share similar concerns, LTE strategies are diverse. Within our sample of eight operator case studies alone, there are huge differences in '4G' marketing emphasis. While Telia and A1 try to woo customers with LTE's faster speeds, CSL and AT&T do not advertise speeds at all, preferring to focus on a better user experience.

In the case of CSL, the importance of '4G' lies just as much in bringing relief to 3G smartphone users as in providing faster speeds. 3G customers benefit from a less congested network when others move to LTE. "3G capacity off-load makes the LTE business case," says Christian Daigneault, CSL's chief technology officer. "LTE is not a new business model. It is about meeting customers' increased capacity demands and making sure they enjoy the same performance as they did a year or two ago."

Tele2 is unusual in that it sells LTE primarily as fixed broadband replacement service with the benefit of mobility. Although Telekom Deutschland has a similar strategy in rural areas, but with no mobility feature, it offers a mobile broadband service in urban areas. Telekom is the only '4G' operator that has two separate ranges of devices and tariffs: one for rural locations and one for cities.

## Regional dividing lines

Despite differences between individual operators, the LTE database compiled by the Economist Intelligence Unit reveals remarkable uniformity of pricing strategies on a regional basis. The higher monthly data caps, for example, are all to be found in Europe. Each of TeliaSonera's operations in Denmark, Estonia, Finland, Norway and Sweden, as well as A1 (Austria) and Vodafone in Germany, offers a data cap of 30GB or higher. One tariff from Tele2 comes with an 80GB cap, the highest in our report.

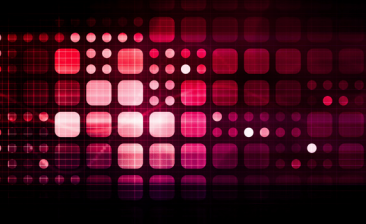


Outside of Europe, and bar Telstra's 15GB data plan, the highest cap in Asia and North America is 10GB—equal to the lowest cap in Europe (with the sole exception of Lithuania's Omnitel, which has a 5GB offer). In Asia and North America, 1GB and 5GB caps are commonplace. SK Telecom also has a 350MB offer, while AT&T starts at 200MB. The lowest data cap on a 4G plan is 100MB, offered by MetroPCS.

The maximum advertised speeds in North America are also usually lower than in Europe and Asia. Verizon Wireless offers up to 12Mbps on the downlink and 5Mbps on the uplink. Bell Mobility (Canada) is the most bullish on download speeds, advertising up to 75Mbps. But Rogers Wireless (Canada) and AT&T, the other two major North American operators that have launched commercial LTE services, do not advertise speeds at all (although the AT&T '4G' network provides similar speeds to Verizon's).

European '4G' is much faster. A1, EMT (Estonia), LMT (Latvia), Telekom Deutschland and TeliaSonera Norway each advertises a service capable of providing up to 100Mbps. The maximum downlink speeds and uplink speeds in Asia are 75Mbps and 37.5Mbps respectively, offered by NTT DoCoMo (Japan), M1 (Singapore) and SK Telecom.





Although European operators tend to price LTE quite highly, their generous data caps mean the price per GB is much lower than in North America and Asia. MetroPCS' US\$40-per-month tariff for 100MB, for example, works out at a hefty US\$400 per GB, while Tele2's Mobilt Bredband XL product, which has an 80GB monthly limit, costs only US\$0.79 per GB.

## Unsophisticated pricing

Most operators have moved away from unlimited data plans. These proved useful in attracting customers, but they meant that operators could not generate more revenue from heavy users. AT&T had estimated prior to the removal of flat rates in June 2010 that 3% of its smartphone users were responsible for as much as 40% of its wireless data traffic. Even so, some all-you-can-eat data plans have carried over to LTE. CSL, EMT, M1 and MetroPCS all offer unlimited '4G' data plans, although each also provides less costly plans with GB caps, apart from M1.

Tiered data pricing is a welcome development because it means that users pay for what they consume. Yet there is a surprising lack of pricing sophistication for LTE. One benefit of LTE is that it gives operators more control over the speeds that customers can access than is possible with 3G. If they wanted, operators could offer a range of pricing plans based on a mixture of speeds and data caps. Few have chosen to do so. Only CSL, Tele2, TeliaSonera (Lithuania and Sweden) and Vodafone in Germany have gone down this path.

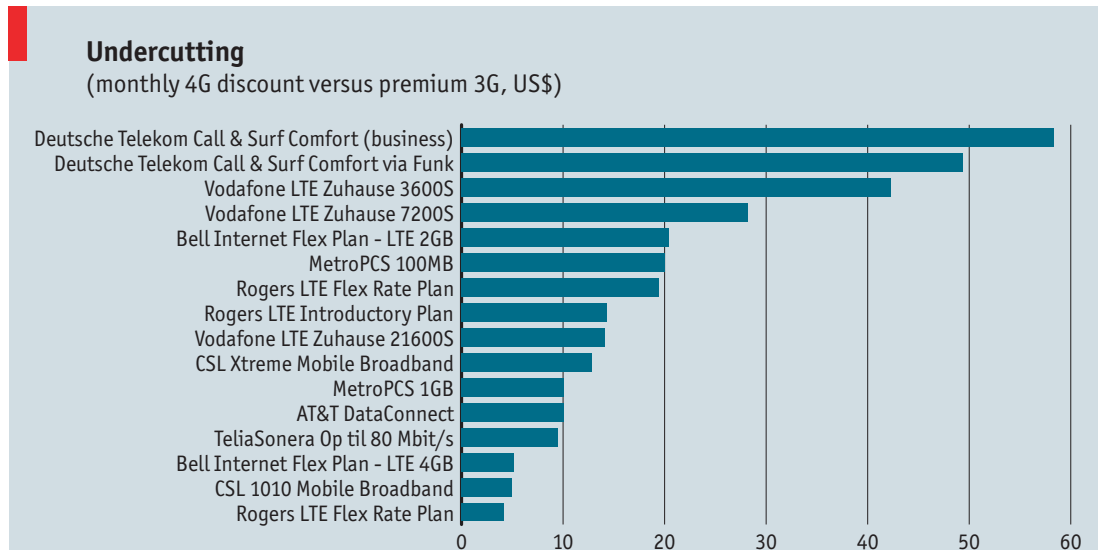
One possible reason is that operators are worried about confusing their customers with too many offers. But while this is a danger, customers, on the whole, prefer choice. Mobile-phone users are also becoming more sophisticated, particularly in markets where mobile broadband services are well established. "At first, customers did not know how much data they were consuming, so we needed unlimited plans to avoid bill shock," says CSL's Mr Daigneault. "Now the customers are learning. They understand their consumption much better and so we have started to experiment with data plans." More pricing innovations, and lower prices, are likely to appear when LTE competition intensifies.

## Cheaper than premium 3G

One surprise finding, perhaps, is that as many as eight operators offer LTE plans that cost the same as or less than their premium 3G services. In the case of Telekom Deutschland and Vodafone, the cheapest LTE plans are targeted at rural areas and offer 3G-like speeds, and so the lower pricing is understandable. Telekom does not even offer mobility with its Call & Surf Comfort packages. But the other operators on the list, four of which are from North America (AT&T, Bell Mobility, MetroPCS and Rogers Wireless), offer cheaper '4G' options targeted at a mainstream market.

The more severe the capacity crunch on 3G networks, the more operators seem likely to lower 4G prices in an effort to lighten the 3G load. No surprise, then, that CSL, which sees capacity off-load as central to its LTE business case, also has plans in its LTE pricing portfolio that match or undercut its premium 3G pricing.

It is North America, though, where the urgency to shift customers off 3G and on to '4G' looks greatest, if pricing is any guide. Average LTE prices there are 3% lower than premium 3G prices (based



on available information). Meanwhile, operators in Europe are the least interested in luring premium 3G customers on to LTE through pricing. Average LTE tariffs in the region are almost twice as much as premium 3G rates. Instead, Europe's LTE operators are hoping to attract customers by promising them much faster services than are available on 3G (which they already advertise at faster rates than in North America). On average, the difference in Mbps between LTE and premium 3G is 38 in Europe, 27 in Asia and 23 in North America.

### Value for money

Although LTE plans in northern Europe carry a relatively high mark-up in comparison with premium 3G services, one could argue they offer better value for money than '4G' offers in North America and Asia.

The LTE 'value for money' index, developed by the Economist Intelligence Unit, looks at four variables: price as a percentage of personal disposable income (PDI); the level of the data-usage cap; the maximum advertised download speed; and the mobility of the service (LTE service plans for smartphones and tablet devices are deemed to have maximum 'mobile value', for example, and so receive a higher score for this variable than plans limited to either USB modems or routers).

To determine how operators rank on the 'value for money' index, an average score is taken of all the LTE plans on offer. The result is a clear victory for Europe. The highest-ranked operator outside the region is Verizon Wireless, in joint fifth place. NTT DoCoMo is ranked joint eighth, while SK Telecom comes in tenth place.

Where North American operators score poorly in relation to their European counterparts is on service speeds and data-usage caps. True, the average downlink speeds provided by European operators are likely to be much lower than their maximum advertised rates. Sweden's Telia, for example, advertises a maximum downlink speed of 80Mbps, but concedes the average service will be somewhere between 20Mbps and 40Mbps. Even so, this is still much higher than Verizon's advertised speed range of 5–12Mbps on the downlink.

### LTE 'value for money' index

Rank	Operator	Country	Score (scale of 1-5)
1	Tele2	Sweden	4.20
2	TeliaSonera	Denmark	4.00
3=	Telenor	Sweden	3.70
3=	TeliaSonera	Finland	3.70
3=	TeliaSonera	Norway	3.70
4	TDC	Denmark	3.40
5=	T-Mobile	Austria	3.20
5=	Verizon	USA	3.20
6=	A1	Austria	3.10
6=	Telekom Deutschland	Germany (urban)	3.10
7	Bell Mobility	Canada	3.07
8=	NTT DoCoMo	Japan	3.00
8=	TeliaSonera	Sweden	3.00
8=	Telstra	Australia	3.00
9	Vodafone	Germany	2.80
10	SK Telecom	South Korea	2.64
11=	Telekom Deutschland	Germany (rural)	1.90
11=	O2	Germany	1.90

Note: only operators that feature details of caps (GB) and download speeds (Mbps) can be included in the 'value for money' index.

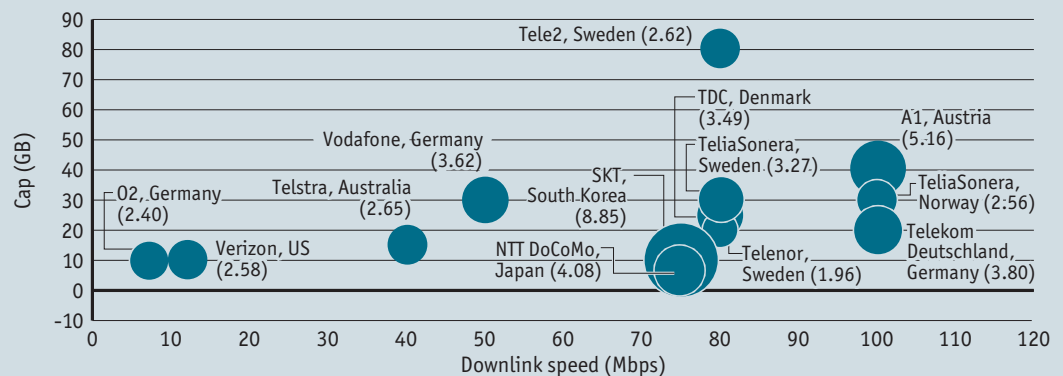
An index weakness for Asian operators is that their LTE tariffs measure highly as a percentage of PDI. The LTE 100 plan from SK Telecom, which includes a voice and text allowance, is priced at US\$92 for a monthly data cap of 10GB. That is a hefty 8.9% of monthly PDI in South Korea. The LTE 100 plan is by far the most demanding on the consumer wallet of all tariffs examined in this report. But SK Telecom accounts for six of the eight highest-ranked tariffs in terms of pricing as a percentage of monthly PDI (A1 in Austria slots into fifth place, with a price that represents 5.2% of monthly PDI, while its rival T-Mobile comes seventh with a tariff equalling 4.6% of monthly PDI). NTT DoCoMo occupies the next two spots in the PDI ranking, with tariffs that work out at 4.1% of monthly PDI. The median is a much lower 2.4%.

Where North America and Asia score better is on mobility. At the time of publication, LTE smartphones and tablet devices had not arrived in Europe. In the US, however, AT&T, MetroPCS and Verizon all offer both smartphones and tablets. SK Telecom and NTT DoCoMo both offer LTE smartphones, as does Canada's Bell Mobility, while rival Rogers Wireless provides a tablet (the HTC Jetstream). Verizon Wireless, flexing its huge purchasing muscle, has the most diverse LTE portfolio of all, with 16 devices as of November.



### The price is right?

(comparison of caps, speeds and pricing as a % of monthly PDI for a selection of premium LTE tariffs)



Note: Bubble size is determined by the price as a % of monthly PDI; actual percentages are shown in brackets.  
Sources: companies; Economist Intelligence Unit.

## '4G' warning for Europe

European operators cannot assume that their LTE service strategies are 'right', despite their good showing on the 'value for money' index. After all, only heavy data users, who consume most or all of their data allowance, get the best price-per-GB deal.

Operators are still learning about LTE data consumption habits. It could well be that European operators will have to offer lower data caps (and cheaper tariffs) to better reflect customer usage. In Hong Kong, Japan and South Korea, where mobile broadband is well established and popular, 4G operators see no reason yet to set data caps above 10GB.

In the US, speeds are much lower than in Europe, but LTE operators there have scope to raise prices for a faster service. European operators have been bullish about LTE's speed capability from the outset, leaving them little room to raise prices for faster downloads and uploads. And if the relatively low data caps in North America and Asia prove to be insufficient, then those can be increased (and priced accordingly). Compared with their North American and Asian counterparts, European operators look backed into a corner on pricing.



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# Media Enquiries for the Economist Intelligence Unit

## Europe, Middle East & Africa

### Grayling PR

Angelina Hunt

Tel: + 44 (0)20 7592 7932

Mobile: + 44 (0)7850 311 441

Sophie Kriefman

Tel: +44 (0)20 7592 7924

Ravi Sunnak

Tel : +44 (0)207 592 7927

Mobile: + 44 (0)7515 974 786

Email: [allgraylingukeiu@grayling.com](mailto:allgraylingukeiu@grayling.com)

## Americas

### Grayling New York

Ivette Almeida

Tel: +(1) 917-302-9946

[Ivette.almeida@grayling.com](mailto:Ivette.almeida@grayling.com)

Katarina Wenk-Bodenmiller

Tel: +(1) 646-284-9417

[Katarina.Wenk-Bodenmiller@grayling.com](mailto:Katarina.Wenk-Bodenmiller@grayling.com)

## Asia

### The Consultancy

Tom Engel

+852 3114 6337 / +852 9577 7106

[tengel@consultancy-pr.com.hk](mailto:tengel@consultancy-pr.com.hk)

Ian Fok

+852 3114 6335 / +852 9348 4484

[ifok@consultancy-pr.com.hk](mailto:ifok@consultancy-pr.com.hk)

Rhonda Taylor

+852 3114 6335

[rtaylor@consultancy-pr.com.hk](mailto:rtaylor@consultancy-pr.com.hk)

## Australia and New Zealand

### Cape Public Relations

Telephone: (02) 8218 2190

Sara Crowe

M: 0437 161916

[sara@capepublicrelations.com](mailto:sara@capepublicrelations.com)

Luke Roberts

M: 0422 855 930

[luke@capepublicrelations.com](mailto:luke@capepublicrelations.com)

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**LONDON**

26 Red Lion Square

London

WC1R 4HQ

United Kingdom

Tel: (44.20) 7576 8000

Fax: (44.20) 7576 8500

E-mail: london@eiu.com

**NEW YORK**

750 Third Avenue

5th Floor

New York, NY 10017

United States

Tel: (1.212) 554 0600

Fax: (1.212) 586 1181/2

E-mail: newyork@eiu.com

**HONG KONG**

6001, Central Plaza

18 Harbour Road

Wanchai

Hong Kong

Tel: (852) 2585 3888

Fax: (852) 2802 7638

E-mail: hongkong@eiu.com

**GENEVA**

Boulevard des Tranchées 16

1206 Geneva

Switzerland

Tel: (41) 22 566 2470

Fax: (41) 22 346 93 47

E-mail: geneva@eiu.com