

What You Really Need to Know About Solving the Capacity Crunch

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The growth of next generation networks like LTE have ushered in quite a quandary for service providers around the world. Wireless providers are now, or will soon be, able to offer high-speed, low-latency data in many areas, but this is proving to be a double-edged sword as rapidly increasing consumption of mobile data traffic is causing a “capacity crunch” for many of them. A number of wireless providers are facing major challenges as a result and must re-evaluate how best to meet forecast demand and charge for usage while providing a user experience customers demand.

As traffic levels grow, some popular solutions wireless providers are actively considering or currently

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implementing include investing in more 3G capacity, offloading to Wi-Fi or femtocells, and optimizing pricing policies to change user behavior. However, in order to truly optimize next-gen networks in terms of revenue growth and customer experience, wireless providers need to take a much more holistic look at the issues across various departments like pricing, marketing, and applications.

Working to optimize any piece of the network in one siloed department is a bit like trying to solve a city's major traffic congestion issues only by building more roads. Eventually, those roads will clog up as well. Smart city planners and engineers would look at different combinations of solutions that can work together, such as building new roads and encouraging telecommuting, adding more bus and public transportation routes, etc.



In that same vein, there is no single strategy wireless providers can implement to solve the capacity crunch problem. They must make their own selection from a wide range of technical and marketing approaches across various departments. The different mixes they choose will begin to differentiate the customer experience from different wireless providers and usher in a new era in competition for the telecommunications industry.

With that in mind, let's take a look at ten complimentary capacity crunch solutions wireless providers may consider:

- 1. Traffic shaping:** With extreme examples of unlimited data use being quoted by several network providers – and figures of 40-50% of network capacity being consumed by 2-3% of users being commonly cited – traffic shaping alone could dramatically increase available capacity. A common example is tracking the monthly data usage of subscribers and throttling back or reducing data speeds when the usage cap has been exceeded. Service providers have found more positive results from their customers by taking this approach. Individuals can choose to accept the reduced service for the remainder of their monthly cycle, or pay a fee to restore high-speed capacity immediately.
- 2. Expand range of data tariffs:** Many providers have recently introduced monthly caps on their data plans to help solve capacity crunch issues. With this approach, educating the customer so that the meaning of data tariffs is fully understood

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is key. Approaches to consider include charging premiums or blocking some types of data traffic, such as streaming video which places high demands on network resources. Such services may be restricted to offpeak times or only through Wi-Fi/femtocells on some tariffs; premium tariffs could be charged for higher performance and/or priority.

3. **Expand existing cellsite capacity:** Operators can expand cellsite capacity in a number of ways, including optimizing and tuning the radio network, installing extra baseband processors to achieve full capacity from each radio carrier, upgrading to HSPA+, sectorization, installing additional carries per cellsite, or rolling out additional macro cellsites.
4. **Roll out LTE:** Long Term Evolution (LTE), which promises greater spectral efficiency and higher data rates than its predecessors, should lead to lower costs in the long term because it requires fewer cellsites to deliver the same payload – however, this is certainly not a quick fix. Spectrum may not be available in some regions, and can be very expensive to buy. Furthermore, a wide range of devices supported by LTE are not expected to be available until at least 2013.
5. **Buy more spectrum:** Governments in some countries are continuing to make new spectrum available, but this is not an option everywhere.

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Additional spectrum allows wireless operators to install extra equipment at each cellsite, increasing capacity without impacting the existing network. However, this option can be very expensive as spectrum is a finite resource.

6. **Offload data to Wi-Fi and femtocells:** By encouraging the use of Wi-Fi hotspots, wireless providers can significantly remove a large proportion of data traffic from their networks. This approach has other benefits too; consumers may find faster data rates and improved response when using smartphones (and laptops) on Wi-Fi rather than connecting to a cellular network. However, downsides are that the handset now requires two radios (3G and Wi-Fi) to be active simultaneously and the service provider has no visibility or control over the data traffic.

Many providers are trialing or launching femtocell services with a view to solving both coverage and capacity problems. This approach offers the

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“Wireless providers that can strategically manage the will gain competitive advantage.”

highest potential capacity, with factors of 100 to 200 times the current capability of outdoor cell sites.

- 7. Deploy “metro-femto:”** The metro-femto concept, first outlined by Vodafone, involves installing large numbers of low-cost cell sites in high data traffic areas. Backhaul connectivity is provided through existing copper wires such as DSL, cable modems or fiber. A mesh arrangement can be used with high-speed fiber links only at each corner of the grid. The estimated capacity of a mesh metro-femto network is around 3Gbit/s per square kilometer.
- 8. Sideload content:** Sideloaded content can be used for content bought on mobile devices. For example, if a customer makes a mobile purchase, the transaction is carried out over mobile network, but larger data files transferred by computer or through your home Wi-Fi or femtocell. AT&T currently does this with the iPhone – requiring purchases from the iTunes Store over 20MB to be downloaded via Wi-Fi.

- 9. Optimize, compress data content:** With video taking up a large proportion of mobile network data capacity, it makes sense to reduce the amount sent, especially where it is wasted. Studies of those viewing YouTube videos uncovered that most do not watch each complete scene. This means that downloading the full video in advance, a standard feature to avoid glitches when watching, wastes a lot of capacity. Additionally, the video may be sent in a format suitable for larger screen sizes, again wasting capacity. Several vendors offer solutions that identify and actively buffer streaming video, transcode it into smaller and more efficient formats, and limit the amount downloaded in advance. Such solutions need to work seamlessly with both the server and a wide range of smartphone devices to provide a good viewing experience.
- 10. Improve application design:** A more subtle form of data optimization involves encouraging and persuading application developers to write better behaved software. Many free and commercial applications are not written with due consideration of their impact on network resources. An application rating system can help further, by rating applications based on their behavior.

Software program updates, another large source



of data traffic, could be moved to download at offpeak times in the middle of the night, saving precious resources during peak times. However this might leave individuals with computers unprotected from the latest exploits, potentially opening up the network operator to legal claims. The issue is further complicated in that most laptops are switched off overnight, and so unable to process the update at that time of day.

Finding the Right Combination

The capacity crunch is highly complex and there is no easy fix or single solution. Wireless providers are likely to use a combination of the solutions

outlined above (as well as new solutions that crop up as next-gen networks evolve), based on cost/benefit analyses and factors such as time to deploy, impact on customer satisfaction, and integration with marketing strategy. Though the effects of the crunch are numerous and have impact across operational boundaries, opportunities exist within the crunch. Wireless providers that can strategically manage the crunch as they roll out next generation networks will gain competitive advantage over rivals that choose less effective strategies.