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Technology

Is telecom infrastructure peaking?

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In Washington, things may finally be starting to happen that will affect the creation of advanced information infrastructure. This follows a year of mostly words, minor symbolic actions, and procedural walkabouts. A paltry one per cent of the federal economic stimulus money had been allocated to broadband communications. Of this, a year later, the first small grants are now trickling out, just as the economic crisis has hopefully turned the corner. But a second concrete activity is approaching -- a plan by the Federal Communications Commission on how to fill in the white spots on the geographic and social maps of broadband penetration.

And here, a report commissioned by the FCC from my colleagues at the Columbia Institute for Tele-Information, Bob Atkinson and Ivy Schultz, provides [illuminating information about capital investment trends in broadband infrastructure \(http://www4.gsb.columbia.edu/citi/\)](http://www4.gsb.columbia.edu/citi/).

First, the good news. According to the aggregate

reports of financial analysts, overall capital investments by telecom carriers, cable TV companies, and broadband wireless providers was \$51bn in 2009. Of these, \$30bn went to broadband construction and upgrade. Investment is projected by Wall Street analysts to remain at that level into 2015.

This is not a small number. It is almost \$250 per household per year. If one adds up the investments over the past 5 years and the projections for next 5 years, plus the payments for spectrum licenses to the Federal government, this would amount to almost half a trillion dollars investments over a decade. Add to that the consumers' and business spending on PCs, wireless routers, and modems, which all add another half a trillion. As a society, we would have spent or are about to spend well over a trillion dollars in a decade on broadband. This is a tremendous amount in a short period.

But can this continue? A first observation is that overall communications infrastructure investment has already declined in 2009 by 14 per cent, from \$59bn to \$51bn. That would be expected perhaps, given the economic downturn.

Technology companies in the hardware business had hoped that the upgrade of the network would resume briskly and exponentially after the current cyclical downturn. But, this is not likely. What is happening is a significant saturation of the market for both broadband and mobile wireless, both the growth engines for the industry. Currently, about 92 per cent of US households have access to at least

one wired broadband platform (adoption stands at about 64 per cent), and about 90 per cent of the population is covered by 3G mobile wireless broadband. For wireline broadband, subscriber growth for 2012 is estimated at an anaemic 1.9 per cent.

There will of course be incremental upgrades, but those cannot compare with the capital intensity of the current buildout stage. Higher speed wireless requires more spectrum and new electronics strung up on the existing towers, but less in new construction. Cable TV infrastructure has already been significantly upgraded and digitized, and adding higher connection speed doesn't require much in the way of capital construction, either. The major telecom carriers have been rapidly upgrading their networks through fibre, either to the neighbourhoods (AT&T and Qwest), or to the home (Verizon). Even many of the small rural telephone companies have rapidly deployed fibre to the home, thanks to explicit and implicit subsidies. Fibre will continue to be deployed, but a few more years of projected \$30bn capex investments will expand this as far as commercial operations will go.

And once households have been connected by some variation of fibre, their future needs for more speed can be satisfied for a long time with relatively inexpensive upgrades of electronics. In any event, such demand for more speed will slow down considerably. Internet speeds of 1 gigabit per second and much more are easily possible with fibre. This is about 50 times as high as many broadband speeds are today. At that speed, a

household can watch comfortably several channels of high definition, 3D, interactive TV. It is not easy to think of consumer mass applications that use up much more bandwidth.

None of this is a sign of crisis, but rather of maturation. Each new infrastructure industry goes through a cycle -- early experimentation, accelerating growth, a flattening out, and eventual decline. All American infrastructure industries had their day in the sun, followed by a pronounced decline in investment. There are few new canals, railroads, super-highways, pipelines, power transmission lines, or airports being built today

Soon, it will be the turn of communications infrastructure investments to slow, mature, and even decline. The basic platforms will have been laid. Improvements will be in applications and in the devices used in networks and by users. But for the infrastructure, a slowing down of investments will be noticeable. This does not mean that the sector will lose in significance. More bits, more minutes, and more miles of communication services will be consumed than ever before. But absent new breakthroughs in radically different distribution technology, for which there are no indications, the huge and expensive construction rollouts will become a thing of the past, and we will move to a mature replacement mode.

For infrastructure technology companies this is not a positive outlook but a wakeup call. They had hoped for an ongoing growth scenario, not declining investment levels by their best customers.

Their business model will have to move to the edge of the network, to users and applications providers, and to less mature markets.

But it is positive news for network providers because their need to invest declines, which improves their bottom line and lowers consumer prices in the long run.

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