

Several reports cast doubt on ITU's spectrum forecasts

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As preparations continue for WRC-15, where decisions will be made on how much spectrum will be needed for future mobile broadband services, three separate papers argue that the model on which forecasts are based is flawed, leading to excessively high estimates and bad policy. Mobile operators, however, say government and industry estimates are consistent and correct.

Many regulators use a model developed by the ITU to produce the spectrum forecasts which will eventually be used to inform decisions at World Radiocommunication Conferences. But the model, used in the December 2013 ITU-R Report M.2290-0 on the future spectrum requirements estimate for terrestrial IMT, “as it stands, does not provide usable or useful results,” LS telcom spectrum consulting manager Richard Womersley and TMF Associates founder Tim Farrar said in a [report](#) published last month.

Some of the ITU's input assumptions appear to be arbitrary and unrealistic

The [ITU report](#) gauged that the demand for spectrum for mobile services in 2020 would be between 1340 MHz in low demand situations and 1960 MHz in high. The problem with the ITU approach is that traffic density appears not to have been benchmarked against total predicted traffic in any particular country, the consultants' report said.

Doing so generates the finding that the traffic densities driving the ITU forecast are “are at least two orders of magnitude (i.e. a factor of 100 times) too high when compared with those which would be expected in any developed or developing country in a 2020 timeframe,” they said. The overestimate comes from a combination of an unrealistic user density (the number of people using each application), and excessive traffic per user (data consumption per person using each application).

The ITU model can't currently be used to make any reliable predictions about spectrum demand until the inputs are “fully reviewed, revised and calibrated to more realistic level,” the report said.

However, alternative methodologies, which generally divide expected traffic growth by an average increase in spectrum efficiency (bits per Hz) and spectrum

re-use (number of cells or cell radius), are also highly vulnerable to input data inaccuracies, it said. A good example was the Federal Communications Commission's October 2010 forecast that 275 MHz of additional spectrum would be needed for US mobile networks to meet demand by 2014. In reality, Womersley and Farrar said, US wireless operators have been able to accommodate all of the traffic growth projected without even using the spectrum already allocated for wireless services by 2010.

The consultants accept that the ITU model's methodology remains more reliable than many of the alternatives. They recommended, among other things, revising the inputs to the model to match projected traffic levels for individual countries in 2020, and benchmarking against best practice network build-out expectations.

Economic and market factors “may prove decisive”

The European Broadcasting Union (EBU) reached the conclusion that mobile data traffic estimates are overblown in a [technical review](#) published earlier this year. This document also criticised ITU-R M. 2290, saying some input assumptions “appear to be arbitrary and unrealistic”.

There are several shortcomings in the ITU approach, said authors Roland Beutler, spectrum manager at German regional public broadcaster Südwestrundfunk, and Darko Ratkaj, senior project manager at the EBU's department of technology and innovation. The assumptions used by the ITU to calculate the spectrum requirements are wrong, and the forecasting methodology inadequate, they said.

“Fundamental revisions” are needed in several areas, the paper said. The ITU failed to differentiate between areas with a high demand for mobile services, which are likely to need more spectrum, and areas with low demand. Instead, it relied on data forecasts which gathered traffic and usage predictions from various sources to generate an overall global estimate up to 2020 which was then used to gauge future spectrum requirements. Failure to reflect geographical variations is “obviously” flawed, the authors said.

Another problem is that the calculation method applied in the ITU report didn't consider the relationship between the way a mobile network is configured and its overall capacity, the EBU said.

A third issue is that the exponential data traffic growth claimed by the mobile industry as justification for requesting more spectrum for IMT is “largely attributed to the increasing consumption of audio-visual content”. But most of that consumption takes place indoors, where fixed broadband networks extended by Wi-Fi are used as the principal means of content delivery. The ITU report

“remains obscure” about what assumptions were made about the distribution of traffic between cellular networks and WiFi, the EBU report said.

The potential for persistent bias in these projections may allow policy errors based on these data to compound over time as opposed to self-correct

The ITU also, among other things, made assumptions about data rates needed for applications that result in overestimated spectrum needs for IMT, the EBU said.

Another problem is that it predicted spectrum demand without taking into account key economic aspects and market developments with significant impact on actual demand and consequent spectrum requirements – factors that “may well prove to be decisive in determining the future evolution of mobile data traffic”.

Given the need for large investments to support the estimated growth of mobile data traffic; the willingness (or not) of consumers to pay; whether investment will generate new revenues or save costs; and the fact that operators' revenues are increasingly under pressure in some countries, “it is appropriate to ask how the rapid increase in the network capacity will be financed”. Without financing, traffic growth will be lower than expected, and corresponding spectrum needs less, the report said.

Forecasts subject to bias

The ITU estimate and the US National Broadband Plan “clearly overstated demand” but nevertheless remain the basis for policy direction, Goldin Associates managing director J. Armand Musey and University of Southern California doctoral candidate Aalok Mehta wrote in an August [working paper](#). The paper is now being updated, Musey told *PolicyTracker*.

“The potential for persistent bias in these projections may allow policy errors based on these data to compound over time as opposed to self-correct,” they wrote.

Upward bias arises from four possible factors, Musey said:

- Limited use of risk management techniques and use of exponential estimation methods.
- Pricing and business development: spectrum forecasters often have no access to mobile operators' business plans or technology developments.
- Wi-Fi offloading and other technological advances as well as compression and network management technology improvements.
- Economic and psychological issues such as “optimism bias” and “strategic misrepresentation”.

Bias can be mitigated via better forecasting processes; more openness from companies and industry groups; making individual analysts accountable for their predictions; and avoiding conflicts of interest by having forecasts handled by independent firms, the report said.

Policymakers should use the best projections possible, insist on high standards from those whose forecasts they use, and incorporate uncertainty and risk into their spectrum policy decisions, it argued.

GSMA estimates within ITU range

The ITU report was “developed and approved by the ITU's members including national governments and industry,” said Herman Schepers, senior director for the GSMA's global spectrum campaign. The GSMA's submission to the ITU came from a spectrum estimate model created by Coleago Consulting which indicated that 1600-1800 MHz would be needed for IMT, he said. “Our average spectrum estimates fall within the ITU range.”

Additionally, said Schepers, several ITU member states also gave the ITU a benchmark to the results. Australia, for example, reported it needed a total of 1081 MHz up to 2020, and an additional 300 MHz by 2020. The UK estimated a total requirement of 775-1080 for the low demand setting, and 2230-2770 MHz for high demand by 2020.

China said it would need 1490-1810 MHz by 2020. While those national spectrum requirements, set out in a table in the ITU report, have differences in the time scale considered, methodology used and assumptions made, “they all fall in the same order of magnitude,” Schepers said. •