ANALYSIS OF THE ITU-R MODEL FOR FORECASTING IMT SPECTRUM DEMAND
Background

• ITU-R Report M.2290 presents forecasts for growth in the total amount of mobile traffic in the World to 2020 & then models the spectrum demand for IMT services based on the forecast traffic

• The model is relatively sophisticated & breaks down traffic into different service environments

The model forecasts that between 1340 and 1960 MHz of spectrum will be needed for IMT services by 2020

• Spectrum regulators place much importance on ITU reports, therefore these values will drive decisions to allocate spectrum for IMT services at WRC 15.
Stakeholders have reviewed the ITU-R ‘speculator’ model

• Model uses a bottom-up prediction based on population density & traffic use to determine traffic densities in each of the service environments.

• Benchmarking the population & traffic density figures in the model against accepted forecasts of population & mobile data growth & usage reveal traffic densities in the model are at least 100 times higher than any realistic benchmarks.

• This is based on unrealistic use of super-high-speed data services together with excessive population densities. For example:
  
  ➔ The urban population density used in the model is the equivalent of putting the population of the USA into an area the size of Paris;
  
  ➔ The population density that the model assumes for high mobility traffic (e.g. that in vehicles) is the equivalent of that which would be found on a 500 lane highway!

Other comments on the model can be found at:

• http://www.wirelesswaffle.com/index.php?entry=entry140215-070132
• http://gigaom.com/2014/02/22/note-to-the-telecom-industry-beware-of-false-models/
Review of ITU ‘speculator’ model - findings

Monthly data traffic PetaBytes per square km; the figures from the low density settings in the ITU model compared with benchmark values for urban area traffic in five example countries.

Image illustrates the traffic that the model shows in each of the service environments, compared to generally accepted forecasts for urban areas in several different countries.

(Note: scale is logarithmic; values from the ITU model are taken from the low demand setting)

- Given the unrealistic values the model uses, it’s outputs cannot be applied to any country
OTHER ISSUES WITH MODEL INPUTS

- Other values are also unrealistic: e.g. spectrum efficiency
- The model does not distinguish between different types of spectrum E.g. It assumes that mobile traffic is handled in the same spectrum as traffic in an office: in reality they would be handled using different network solutions in different bands such as WiFi

- The model can be significantly modified to produce more valuable results
- Other organisations have also produced alternative spectrum demand models
- The ITU model itself, is the most comprehensive & robust

- Whilst the values in the model are unrealistic, the model itself is a good basis for IMT spectrum calculations
Conclusions

Based on the analysis before, we can conclude:

- The ITU model itself is a good basis for calculating demand for IMT spectrum but requires modifications (e.g. to consider how demand is focussed in different frequency bands);
- The population density & traffic usage values in the ITU model are orders of magnitude too high;
- Other inputs to the ITU model (e.g. spectrum efficiency) are also unrealistic;
- The model cannot be applied to any country for the purposes of assessing IMT spectrum demand in that country.
Recommendations

Therefore, it is recommended that:

• To be a sound basis for responsible, international decision-making, the inputs to the ITU model need to based on real-world values;
• Regulators should not take decisions based on the existing ITU model results - as the inputs are unrealistic, so equally are the outputs;
• Spectrum demand should not be based on values representing the most densely populated area(s) in the world;
• Any country should be able to apply the model to its own situation & obtain valid results if it is to take a decision based on that model.