HetNet Bandwidth Demand Model

Version: full1.0

Welcome to iGR's new Hetnet Bandwidth Demand Model. The goal of this model is to show the bandwidth demands across the HetNet for various scenarios. The model is built using Microsoft Excel - we have used an older version with simply calculations, so there should be few compatibility issues.

The model shows five HetNet components: Home WiFi (WiFi use in the home on a range of devices), Mobile Broadband (cellular networks including 3G and 4G/LTE), WiFi Offload - User Driven (where the user decides to use available WiFi services outside the home or office), WiFi Offload - Carrier Driven (where the cellular carrier steers the user's traffic off the macro network), and WiFi Only (mobile devices used outside the home or office on WiFi networks only - no 3G or 4G capability).

The model is structured as follows:

About iGR sheet: gives an overview of iGR.

Inputs sheet: provides the inputs to the model. There are just four inputs - the population of the market to be modeled, the number of households, the type of market to be modeled and if WiFi Offload should be included or not.

The **Type of Market** indicator changes the profile of the market and the users within it. The four options are **Urban, Metropolitan, Rural and National**.

The model results are shown in a series of five **Results** sheets:

Results - Total: this shows the Bandwidth Demand for the entire market. For example, if the population and number of households input are 1,000,000 and 100,000 respectively, and the type of market is Urban, this sheet will show the total bandwidth demand across the HetNet for all users in the market.

Results - Light: this shows the Bandwidth Demand for the Light users and households in the model. For the definition of Light, see below.

Results - Medium: this shows the Bandwidth Demand for the Medium users and households in the model. For the definition of Medium, see below.

Results - Heavy: this shows the Bandwidth Demand for the Heavy users and households in the model. For the definition of Heavy, see below.

Results - Extreme: this shows the Bandwidth Demand for the Extreme users and households in the model. For the definition of Extreme, see below.

Each Results sheet shows the total bandwidth consumed for that profile in the market modeled, the number of users and the usage by time of day for each component of the HetNet. All of the data is forecast from 2012 to 2017.

User and Household Profiles

Not all users and households act in the same way, use the same devices or use the same amount of mobile data. iGR has therefore modeled four different categories of users and households to represent the various segments of the market.

Note that the percentage of Light, Medium, Heavy and Extreme users and households in a market varies according to the Type of Market. For example, an Urban market will have a higher percentage of Extreme users and households than a Rural market.

The four profiles iGR defines are:

Light Users and Households: Casual, infrequent data use; a minimal amount of web browsing, social networking, photo sending, email, mapping, etc.

Medium Users and Households: Less casual, more frequent data use than a Light user, perhaps includes the addition of some usage of audio/video streaming and application downloading. Generally speaking, Medium and Light users and households comprise the majority of all subscribers.

Heavy Users and Households: Significant and frequent use of the mobile device and a variety of applications – audio and video streaming, application downloads, social networking, email, etc. This type of connection might represent a mobile worker who travels several days per week or a household with multiple people using many

Extreme Users and Households: These are users that look a great deal like a wired Internet connection – i.e., several gigabytes (GB) of usage per month on a mobile connection. This type of connection is likely to be a laptop / tablet tethered to a smartphone or a connection via a USB/embedded modem. The person behind the device(s) might be a mobile worker who's always out of the office or a consumer running a BitTorrent client, constantly checking Facebook, downloading music or podcasts, streaming music, watching Netflix, etc. This household will use hundreds of gigabytes of data per month and will have multiple WiFi devices for gaming, streaming movies and Web browsing, etc.

Contact iGR

If you have any questions about or problems with the HetNet Bandwidth Demand Model, please contact Iain Gillott at iain@iGR-Inc.com.