

# **EXHIBIT 1**

**PR Wireless, Inc. (dba Open Mobile)**  
**FRN 0015991664**  
**Station WQJU652**  
**REAG 010**

## **Form 601 Coverage Buildout Methodology and Comments**

The purpose of this exhibit is to detail the engineering methodology and addendums to Form 601 to adequately satisfy the Commission's buildout requirements for Open Mobile's spectrum on REAG 010, in the upper C block of the 700MHz spectrum (callsign WQJU652).

The exhibit has been prepared in response to a Notice of Return regarding a previous 601 form documentation, with file number 0005833453.

This spectrum has been utilized to provide FDD-LTE technology service in the PR area.

Section 27.14(h) of CFR 47 states that "WCS licensees holding REAG authorizations for Block C in the 746-757 MHz and 776-787 MHz bands or REAG authorizations for Block C2 in the 752-757 MHz and 782-787 MHz bands shall provide signal coverage and offer service over at least 40 percent of the population in each EA comprising the REAG license area no later than June 13, 2013 (or within four years of initial license grant, if the initial authorization in a market is granted after June 13, 2009), and shall provide such service over at least 75 percent of the population of each of these EAs by the end of the license term. For purposes of compliance with this requirement, licensees should determine population based on the most recently available U.S. Census Data."

We will show with this exhibit that we are meeting §27.14(h) criteria for the first buildout requirement as of June 13, 2013, as Open Mobile was already covering 73.38% of the population as measured using RSRP levels.

We have produced the following items for this exhibit:

- **Electronic Coverage Map – Addendums A&B (RSRP and RSSI levels respectively)**
  - Proposed coverage (red for RSRP Addendum A, yellow for RSSI Addendum B)
  - Transmitter sites (with corresponding antenna orientations in grey)
  - Distance scale (in mi)
  - Projection (NAD 83)
  - Labeled Latitude and Longitude lines in map

- Legend accurately identifying map attributes
  - FCC generated map showing the REAG and EA divisions (REAG10 coincides with EA 50). Addendum C
- **Technical Documentation**
    - Engineering Methodology:
      - We have used the Atoll RF propagation and planning tool, version 3.2, from Forsk, to model all RF attributes. Our current Atoll project uses models for different clutter types that were tuned to our market using CW transmitter data. This analysis was performed by our engineering team in conjunction with Ericsson's RF design team for this particular network.
      - The Electronic coverage maps attached to this addendum are based on this methodology.
    - Propagation Model
      - Atoll Standard Propagation Model with different clutter types as defined in link budget below.
    - Calculation of coverage area
      - Area covered / Total market area (REAG010) (mi<sup>2</sup>)
        - @ -110dBm in RSRP – 1,962.65mi<sup>2</sup> / 3,648.73mi<sup>2</sup> (53.79%)
        - @ -92dBm in RSSI – 2,247.54mi<sup>2</sup> / 3,648.73mi<sup>2</sup> (61.60%)
      - Pops covered / Total pops in market (REAG010)
        - @ -110dBm in RSRP – 2,812,129 / 3,832,194 (73.38%)
        - @ -92dBm in RSSI – 3,040,217 / 3,832,194 (79.33%)
    - Census data used
      - 2010 inhabited census tracts
    - Type of service
      - Mobile Broadband
    - Proposed technology and BW
      - FDD-LTE in 10MHz paired spectrum (700MHz upper C) with 500kHz guard bands
  - **System Design**
    - The network was designed for having 3Mbps DL and 1Mbps UL at a 'service cell edge'. We consider the network to have coverage up to that point (although there may still be RF coverage that extends beyond that point). This is the basis for the UL and DL link budgets for each clutter type in our network. A map of our clutter classes is available as Addendum D.
    - Based on these target data rates, the system was designed using the following:
      - On our 10MHz paired LTE carrier, and for the physical downlink shared channel, we have that at cell edge, and assuming no MIMO is possible, the

upper limit that a user will experience for data rate is governed by the amount of symbols that the system can serve per unit time:

$$= 50RB's \cdot \frac{12 \text{ symbols}}{RB} \cdot \frac{11 \text{ times every 2 slots}}{\text{subframe}} \cdot \frac{1 \text{ subframe}}{1 \text{ ms}}$$

$$= 6.6 \text{ Msymbols/second}$$

- We use this result to find the CQI that we need to serve at this ‘service cell edge’ to have 3Mbps of cell border throughput. CQI and modulation and coding combinations for LTE are given below:

CQI index	modulation	code rate x 1024	efficiency
0	out of range		
1	QPSK	78	0.1523
2	QPSK	120	0.2344
3	QPSK	193	0.3770
4	QPSK	308	0.6016
5	QPSK	449	0.8770
6	QPSK	602	1.1758
7	16QAM	378	1.4766
8	16QAM	490	1.9141
9	16QAM	616	2.4063
10	64QAM	466	2.7305
11	64QAM	567	3.3223
12	64QAM	666	3.9023
13	64QAM	772	4.5234
14	64QAM	873	5.1152
15	64QAM	948	5.5547

From this, we know that 3Mbps/6.6Msymbols/s = 0.45bits/symbol. Therefore, we need to have a CQI of at least 4 at cell edge to ensure a 3Mbps cell edge throughput. For the uplink, the design threshold determined the RB’s (transmission bandwidth) required at cell edge to achieve 1Mbps.

- Field testing in our market performed by Ericsson concluded a RSRP level of -110dBm or better was required for a CQI=4.
- Utilization was calculated based on a call model assuming 100,000 LTE subscribers for the initial network deployment. A 1:5 active RRC (radio resource connected) ratio was also assumed. The traffic distribution was taken from our 3G network usage pattern and loaded into a traffic map in Atoll (our propagation and modeling tool). From these variables, the tool determined utilization at each transmitter.

- Interference was calculated by the tool using a Monte Carlo simulation of users based on the traffic map.

- **Forward and reverse path link budgets**

- Link budgets for forward and reverse paths are summarized in the tables below per clutter type.
  - Data rates to each link budget are specified
  - Signal to interference plus Noise ratio – SNR as in table
  - Received signal levels for mapping– RSSI -92dBm and RSRP -110dBm
  - MAPL – DL / UL (link budget) – shown as Max. pathloss in link budget table
  - Each scenario as seen below corresponds to a specific clutter type (DU=Dense Urban, U=Urban, SU=Suburban/Rural). Therefore, each clutter has its own tuned propagation model and link budget.
  - The 90% and 95% thresholds indicate the cell edge coverage probability thresholds in each model.

**Cell border throughput UL 1 Mbps and DL 3 Mbps**

Uplink link budget	Scenarios						
	DU_90%	DU_95%	U_90%	U_95%	SU_90%	SU_95%	
UE output power	23	23	23	23	23	23	dBm
Resource blocks (RBs)	17	18	17	16	16	16	
Power per RB	10.8	10.5	10.7	10.8	10.9	10.8	dBm
Thermal noise	-174	-174	-174	-174	-174	-174	dBm
RBS noise figure	2.2	2.2	2.2	2.2	2.2	2.2	dB
User bitrate	1	1.1	1.1	1	1	1	Mbps
SNR	0	0	0	0	0	0	dB
RBS sensitivity	-119.2	-119.2	-119.2	-119.2	-119.2	-119.2	dBm
Antenna gain (RBS+UE)	15.1	15.1	15.1	15.1	15.1	15.1	dB
Installation loss (RBS+UE)	0.2	0.2	0.2	0.2	0.2	0.2	dB
Penetration loss	18	18	16	16	12	12	dB
Fading margin	5.1	9.9	4.2	8.4	3.1	6.7	dB
Max. pathloss unloaded	121.9	116.7	124.6	120.6	129.9	126.2	dB
Utilization	18%	26%	18%	24%	20%	14%	
Interference margin	2.5	4.9	1.9	4.3	0.5	1.1	dB
Max. pathloss	119.4	111.9	122.7	116.2	129.3	125.1	dB

Range	0.65	0.4	0.93	0.61	2.89	2.2	km
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Downlink link budget							
RBS output power	40	40	40	40	40	40	W
Resource blocks (RBs)	50	50	50	50	50	50	
Power per RB	29	29	29	29	29	29	dBm
Thermal noise	-174	-174	-174	-174	-174	-174	dBm
UE noise figure	7	7	7	7	7	7	dB
User bitrate	8	6.8	8.6	6.8	12.4	10.6	Mbps
SNR	2.8	1.7	3.4	1.7	6.3	5	dB
UE sensitivity	-111.6	-112.8	-111.1	-112.7	-108.2	-109.5	dBm
Antenna gain (RBS+UE)	15.1	15.1	15.1	15.1	15.1	15.1	dBi
Installation loss (RBS+UE)	2	2	2	2	2	2	dB
Penetration loss	18	18	16	16	12	12	dB
Fading margin	5.1	9.9	4.2	8.4	3.1	6.7	dB
Max. pathloss unloaded	130.7	127	133	130.4	135.1	132.9	dB
Utilization	24%	24%	22%	24%	16%	16%	
Interference margin	11.3	15.1	10.3	14.2	5.8	7.7	dB
Max. pathloss	119.4	111.9	122.7	116.2	129.3	125.1	dB
Received Signal Strength	-94.7	-95.8	-94.1	-95.7	-91.2	-92.5	dBm
Range	0.65	0.4	0.93	0.61	2.89	2.2	km