



www.maravedis-bwa.com

665 Guy Suite 6
Montreal, QC, Canada H3J 2V5

Tel: (305) 865-1006
Mobile: (514) 823-4096
Fax: (514) 313-5465

afellah@maravedis-bwa.com

“BRS,EBS and WCS Regulatory and Licensing Analysis ”

December 2005

By Doug Docherty

Client Confidential

Copyright ©November 2005

Maravedis Inc

All data contained in this report is proprietary to Maravedis Inc and may not be distributed in either original or reproduced form to anyone outside the client's internal organization within five years of the report date without prior permission of Maravedis Inc. The material contained herein is for individual use of the purchasing Licensee and may not be distributed to any other person or entity by such Licensee including, without limitation, to persons with the same corporate or other entity as such Licensee, without the express written permission of Licensor.

Maravedis Inc makes no warranties express or implied as to the results to be obtained from use of this report and make no warranties express or implied of merchantability or fitness for a particular purpose. Maravedis Inc shall have no liability to the recipient of this report to any third party for any indirect, incidental, special or consequential damages arising out of use of this report.

Maravedis return Policy:

Downloaded or sent reports in any format are not refundable, nor credited under any circumstances. It is the responsibility of the sole buyer to verify through the Table of Contents and the Executive Summary that the report fits its information needs.

About Maravedis

Maravedis is an objective, third party research and analysis firm focusing on Broadband Wireless Access technologies including WiMAX, 802.20, TD-CDMA and Wireless Local Loop Systems. Maravedis Mission is be the most trusted bridge between the world of emerging technologies and the world of real deployments and sound business models.

Maravedis has established itself over the years as the most credible and reliable resource for market intelligence in the broadband wireless industry. Maravedis works with equipment vendors, service providers, and the investment community to produce a sound analysis of equipment shipments, emerging trends and realistic market forecasts worldwide.

Table of Contents

Table of Contents.....	3
Glossary of Terms.....	5
Executive Summary.....	6
Report Methodology.....	9
1 Wireless Communication Service (WCS).....	13
1.1 Some History.....	13
1.2 Current Background.....	14
1.3 WCS Band Plan(CFR 47 §27.5).....	15
1.4 Frequencies (§27.5).....	15
1.5 Service Areas (CFR 47 §27.6).....	16
1.6 Power Limits (§27.50).....	17
1.7 Emission Limits (§27.53).....	17
1.8 FDD / TDD Status of WCS.....	18
1.9 Fixed / Mobile Services.....	18
1.10 Summary of WCS Licensee winning bids.....	18
2. BRS / EBS – New Technical Rules.....	19
2.1 Background.....	19
2.2 BRS Frequency Plans.....	20
2.3 BRS Channel Plan (CFR 47 §27.5).....	21
2.4 Transition Plan.....	23
2.5 Power Limits (§27.50).....	24
2.6 Emission Limits (§27.53).....	25
2.7 Signal Strength Limits (§27.55).....	26
2.8 Geographic Service Area (§27.1206).....	26
2.9 FDD / TDD Status.....	27
2.10 Fixed / Mobile Services.....	27
2.11 Summary of BRS Licensees.....	28
2.12 Summary of EBS Licensees.....	28
3. Outlook for U.S. Broadband operations in the 2.3 and 2.5 GHz bands.....	30
3.1 BRS Outlook.....	30
3.2 WCS Outlook.....	31

4. Licensing Information.....32

Appendix 1: BRS Licensee Listing by Company showing Service Area, Location, License Grant and License Expiration Dates.....32-233

Appendix 2: WCS Licensee Listing by Company showing Service Area, Location, License Grant and License Expiration Dates.....234-240

Appendix 3: WCS Licensee Listing by Company showing Channels, Bandwidth, Population served, and License Location.....241-245

List of Exhibits

EXHIBIT 1: REAGS AND CONSTITUENT MEAS 14

EXHIBIT 2 WCS BAND PLAN..... 15

EXHIBIT 3 WCS SERVICE AREAS: 16

EXHIBIT 4. BRS FREQUENCY PLANS20

EXHIBIT 5. BRS CHANNEL PLAN21

EXHIBIT 6. BRS GUARD BAND CHANNELIZATION22

Glossary of Terms

BTA (Basic Trading Area) A BTA is geographic region defined by a group of counties that surround a city, which is the area's basic trading center. The boundaries of each BTA were formulated by Rand McNally & Co. who maintains exclusive intellectual property rights over their use. BTAs are used by the FCC to determine service areas for PCS wireless licenses as well as other services, including BRS and WCS licensees. There are 493 BTAs in the U.S. including the Pacific Islands and Puerto Rico. BTAs are often used in conjunction with Major Trading Areas, as defined below.

FRN (FCC Registration Number) FRNs are used by the FCC's Universal Licensing System (ULS). A unique FRN is assigned to each licensee by the ULS and is used to identify this licensee throughout the ULS databases.

GSA (Guaranteed Service Area) See PSA below.

MEA (Major Economic Area) An MEA is a Market service area defined by the FCC based on U.S. Census data. There are a total of 52 MEAs in the U.S. MEAs are used to define Market service area for WCS licensees as well as other FCC services.

MTA (Major Trading Area) Usually composed of several contiguous basic trading areas. A service area designed by Rand McNally, who maintains exclusive intellectual property rights over their use. MTAs have been adopted by the FCC to define market service areas. There are 51 MTAs in the United States.

PSA (Protected Service Area) A PSA is an exclusive license service area granted to either a BRS or EBS licensee. Each PSA is comprised of a 35 Mile Radius surrounding the licensed transmitter site. PSA is used interchangeably with GSA

REAG (Regional Economic Area Grouping) An REAG is a Market service area defined by the FCC. There are a total of 12 REAGs in the U.S. REAGs are used to define Market service areas for WCS licensees as well as other FCC services.

Executive Summary

As of November 2005 there were 1,767 BRS Licenses and 2,571 EBS Licenses listed on the FCC ULS License Search web site. These numbers have been very stable over the past several months with only the occasional change in ownership noted. An examination of the license details shows that there has been very little change activity in these licenses in the past couple of years. There is not likely to be much activity until the transition proceeding is complete.

Those licenses were shared amongst 1,980 license holders (companies) controlling the totality of EBS, BRS and WCS licenses in the USA.

Initially MDS licensees paid a total \$216 millions through the initial auctions in 1996 and thereafter. Since then, many licenses changed hands. Now there are 367 companies using the BRS spectrum and a staggering 1,598 companies controlling the EBS spectrum. This report provides a current and clear listing of who are those licensees.

Until 2005 commercial broadband wireless operations in the 2.3 GHz (WCS) band have been limited primarily to equipment trials or limited deployments in small markets. In the 2.5 GHz (BRS) band operations have been ongoing for years by the incumbent MDS and ITFS operators. These operations have been limited to video and limited data service. This service was generally used for the transmission of data and video programming to subscribers using high-powered systems, also known as wireless cable. Over the years the uses have evolved to include digital two-way systems capable of providing high-speed, high-capacity broadband service, including two-way Internet service via cellularized communication systems. Such services provide consumers integrated access to voice, high-speed data, video-on-demand, and interactive delivery services from a wireless device.

There has been very little activity in the WCS licenses since they were granted in 1997. A total of 282 x 5.0 MHz licenses equivalent to 1,410 MHz of spectrum were made available for this service.

WCS Outlook

WCS License holders are getting ready for a significant push in 2006/7 as most of the WCS licenses were granted in 1997 and are due to expire in 2007. RFPs activity has increased significantly in 2005 from those license holders as

confirmed by vendors themselves. Many of these companies are in the same equipment search mode as their BRS counterparts. For those licensees who hold both BRS and WCS licenses (notably BellSouth and Nextel) it makes good sense that they will combine their broadband service offerings under a common equipment supplier. After all, a potential customer does not care whether his WISP is providing service in the 2.3 or 2.5 GHz band.

Overall, Maravedis believes that 2006 will be the year of decision for both WCS and the newly transitioned BRS Broadband Wireless offerings.

BRS Outlook

In 2004, the Commission released a ruling defining the transition of the MDS/ITFS rules to a new service called BRS – including commercial Broadband (BRS) and Educational (EBS) broadband services. Since release of this R&O¹, several petitions for reconsideration have been filed by interested parties seeking modifications to the ruling. These petitions will serve to extend finalization of the transition process. The Commission was supposed to rule on these petitions in September, but this process was put on hold due to the hurricanes, etc. Public comment solicitations have not yet been circulated by the FCC. It is hoped that this will occur before the end of 2005. Another factor delaying widespread commercial deployment is that some of the major license holders (BellSouth, Nextel, etc.) are still evaluating equipment and planning their networks. Several of these licensees have stated that they want to deploy mobile WiMAX. Nextel (Sprint) are developing an 802.16 e based solution in partnership with Mororola.

Craig McCaw's Clearwire (dba Fixed Wireless Holdings) is proceeding with a portable NLOS² solution from its manufacturing arm NextNet Wireless. BellSouth is proceeding with limited deployments using a pre-WiMAX product from Navini Networks. BellSouth is likely to accelerate completion of their Florida BTA licenses next year as these were granted in 1996 and expire in March 2006.

The challenge for all operators is that WiMAX radios in the 2.3/2.5GHz bands will not be commercially available until at least the end of 2006. Therefore license holders will have to continue deploying proprietary or "Pre-WiMAX" equipment for at least another 12 to 15 months.

¹ Report and Order and Further Notice of Proposed Rulemaking, WT Docket No. 03-66, FCC 04-135 – Released July 29 2004.

² Non Line Of Site.

Summary of the three major BRS Licensees:

Today the 3 top license holders of BRS/WCS spectrums in the US have licenses which cover 80 percent of the population.

Licensee	PSA	BTA	POP	MHz
BellSouth, dba BellSouth Wireless Cable	36	6	9,070,577	TBD
Clearwire Db a Fixed Wireless Holdings	59	24	4,693,347	TBD
Nextel (Including Sprint)	268	198	157,519,832	TBD

Sprint and Nextel currently have a combined total equity value of approximately \$70 billion and serve more than 35 million wireless subscribers on their networks and 5 million additional subscribers through affiliates and partners. The two companies, along with their affiliates and partners, operate networks that directly cover nearly 262 million people, more of the U.S. population than any other carrier.

The key decision of the FCC not only allowed the combined company to keep its 2.5GHz spectrum, but laid down conditions that should see broadband services based on it be within reach of at least 30 million US homes before the end of the decade. According to the FCC statement, the combined operator is under obligation to "fulfill its voluntary commitment to meet certain milestones for offering service in 2.5GHz band, unless circumstances beyond its control prevent the merged entity from reaching those milestones". Specifically, Sprint Nextel is required to offer services using this spectrum to reach at least 15m Americans within four years, and an additional 15 million potential subscribers within six years.

The FCC has already announced plans to open up the 3.6GHz band under a light licensing scheme to stimulate rural broadband, which still may be pushed mostly to start ups, rather than fall into the hands of the RBOCs. But that 3.6GHz spectrum will be shared, so the 2.5GHz and 2.3GHz bands are the most likely to lead to a country wide broadband wireless service in licensed spectrum.

This in turn will trigger other BRS license holders to accelerate their deployments or... resell/lease their existing licenses when possible!