Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In The Matter Of	)	
	)	
Service Rules for the 698-746, 747-762 and 777-792 MHz Bands	)	WT Docket No. 06-150
	)	
Revision of FCC's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems	)	CC Docket No. 94-102
	)	
Section 68.4(a) of the FCC's Rules Governing Hearing Aid-Compatible Phones	)	WT Docket No. 01-309
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Biennial Regulatory Review- Amendment of Parts 1, 22, 23 27, and 90 to Streamline and Harmonize Rules Affecting Wireless Services	)	WT Docket 03-264
	)	
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	)	
Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band	)	PS Docket No. 06-229
	)	
Development of Operational, Technical & Spectrum Requirements for Meeting Federal, State, & Local Public Safety Communications Requirements Through the Year 2010	)	WT Docket No. 96-86
	)	

COMMENTS OF QUALCOMM INCORPORATED

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SUMMARY

In these Comments on the Further Notice of Proposed Rule Making ("FNPRM) in the captioned proceedings, QUALCOMM Incorporated ("QUALCOMM") focuses on two fundamental points, one relating to the 700 MHz commercial spectrum to be auctioned and the other relating to the 700 MHz public safety band. First, with respect to the commercial spectrum, the Commission's system of auctioning new spectrum licenses to the highest bidder has been a remarkable success. Auctions have enabled the US wireless market to flourish into what the Commission has found to be a robustly competitive market, in which new services, new devices, and new applications are brought to market literally every day at ever-decreasing price points. In fashioning final rules for the 700 MHz commercial spectrum, QUALCOMM urges the Commission to reject proposals that would needlessly restrict entry into the 700 MHz auction or that would put the Commission in the position of mandating or forbidding particular business models. The Commission should continue to adhere to the policies which have made the US wireless market the envy of the world—the new spectrum should be auctioned to all comers, without the imposition of any eligibility requirements, and the high bidders should be able to use the spectrum as they see fit, without having to adopt or eschew any particular business model.

Accordingly, the Commission should not make incumbent local exchange carriers, incumbent cable operators, or large wireless carriers ineligible for licenses in the 700 MHz Band or require these companies to bid through structurally separate affiliates. There is simply no reason to keep any companies out of the bidding, and thereby confer a competitive advantage on others who would be able to bid in an auction with artificially depressed prices. In fact, the available evidence is just the opposite. In its most recent assessment of the state of competition in the US wireless market, the Commission found that there is "effective competition;" the

market "continues to behave in a competitive manner;" "consumers continue to pressure carriers to compete on price and other terms and conditions of service by freely switching providers in response to differences in cost and quality of service;" "competitive pressure continues to drive carriers to introduce innovative pricing plans and service offerings, and to match the pricing and service innovations introduced by rival carriers;" mobile voice calls are "far less expensive on a per minute basis in the United States than in Western Europe and Japan;" and, "deployment of next-generation networks based on competing technological standards continues to be an important dimension of non-price rivalry in the U.S. mobile telecommunications market."[1] The Commission's findings, which were made less than a year ago, establish that there is no need for the Commission to establish any eligibility requirement for the 700 MHz auction.

In the same vein, the evidence demonstrates there is no need for the Commission to mandate or forbid any particular business model to be used by new 700 MHz licensees, and, indeed, it would be a significant mistake for the Commission to do so. Such a mandate or prohibition runs directly contrary to the very premises of the Commission's system of auctions, namely that an auction will award spectrum to the entities valuing the spectrum most highly who will put the spectrum to its highest and best use as competitive market forces are allowed to work. As already shown, this system of free market auctions has served our nation very well. Competition in the wireless market is intense, resulting in low prices for an ever expanding array of new services, devices, and applications. In the case of 700 MHz, the Commission should follow its own highly successful policies and reject the radical proposals that it impose some new, ill defined "open access" requirement; that it forbid the licensees from offering retail service; or, that it mandate licensees to enter into roaming agreements (on undefined terms). All

[1] Eleventh Report, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, 21 FCC Rcd 10947 (2006) "(Eleventh Report").

of these proposals are do not solve any real problem. In sum, in adopting rules for the 700 MHz commercial spectrum, QUALCOMM urges the Commission not to impose intrusive, burdensome regulations on the ultra-competitive wireless industry and instead set rules for the band that will unleash the marketplace forces on this new spectrum.

With respect to the 700 MHz public safety band, as QUALCOMM has long maintained, it is fundamentally important that that our nation's public safety officers have access to a nationwide interoperable, high speed, wide area wireless broadband network, the kinds of innovative devices that operate on such a network, and the full panoply of wireless broadband applications which public safety agencies need. These tools are available today in the commercial wireless market, which is driven by constant technological innovation, and, likewise, they should also be available for public safety.

Accordingly, QUALCOMM supports the Commission's tentative conclusion to reconfigure the band to create two blocks of 5 MHz each for public safety wireless broadband services along with two 1 MHz blocks of guardband to protect adjacent narrowband operations from interference. As QUALCOMM showed in previous filings, reconfiguring the band into a 6 + 6 arrangement (between broadband and narrowband) along the lines of the Commission's tentative conclusion, rather than a 3 + 6 +3 plan, would reduce the amount of guardband required to 1 MHz in each of the two blocks and would achieve much more efficient use of the overall allocation.

As QUALCOMM has also shown previously, broadband technology will deliver data much faster with far greater capacity and range than wideband technology. In particular, the EV-DO broadband technology delivers data faster than the SAM wideband technology by several orders of magnitude. EV-DO's coverage is better than SAM's, and EV-DO has far more

capacity. As a result, EV-DO cell antennas can be located higher than SAM cell antennas, and an EV-DO network can serve the same number of users with larger cells. By locating its antennas higher, EV-DO will create less interference to nearby narrowband receivers. Moreover, SAM has no ecosystem today, nor is one likely to develop. By contrast, EV-DO will give public safety access to a broad array of devices and applications from the many vendors who already sell EV-DO products and services to the commercial market.

Finally, with respect to interoperability, QUALCOMM once again points out that if public safety agencies deploy EV-DO and/or WCDMA/HSPA, for example, either in a national network or in regional networks, there will be full interoperability, based on the use of devices with multi-mode chips. By contrast, if public safety agencies deploy networks based on multiple technologies, all broadband or some broadband and some wideband, for which multi-mode chips are not available, there will not be full interoperability. Depending on the technologies selected, multi-mode chips, even if available, will increase device costs and complexity and will ruin the economies of scale that would otherwise be achieved. Use of a single air interface would achieve full interoperability at the least possible cost.

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TABLE OF CONTENTS

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COMMENTS OF QUALCOMM INCORPORATED

QUALCOMM Incorporated ("QUALCOMM"), by its attorneys, hereby submits its Comments in response to the FNPRM, which the Commission released in the above-captioned proceedings on April 27, 2007.[2]

[2] Report and Order and Further Notice of Proposed Rule Making, FCC 07-22, released April 27, 2007.

I. Background

QUALCOMM is a world leader in developing innovative digital wireless communications technologies and enabling products and services based on the digital wireless communications technologies that it develops. QUALCOMM is the pioneer of the code division multiple access ("CDMA") technology, which is utilized in the 3G CDMA family of wireless technologies. These technologies include CDMA2000 and WCDMA/HSPA, which are the two technologies used in third generation ("3G") wireless networks and devices to enable consumers to enjoy advanced, high speed, and ubiquitous wireless services. QUALCOMM broadly licenses its technology to over 140 handset and infrastructure manufacturers around the world.

QUALCOMM is also a Commission licensee. QUALCOMM holds licenses covering the entire nation for Block D in the Lower 700 MHz Band, Channel 55, 716-722 MHz. On that spectrum, QUALCOMM's wholly-owned subsidiary, MediaFLO USA, has launched a service called MediaFLO to deliver high quality video and ultimately high quality audio and data to third generation cell phones. Today, even before the DTV transition has been completed, the MediaFLO service is available in 28 major markets around the country, delivering news, sports, children's, and entertainment content to subscribers of Verizon Wireless at mass market prices (up to $15 per month). Later this year, this innovative MediaFLO service will also be available to subscribers of AT&T Mobility (Cingular).

QUALCOMM's 3G CDMA technologies are proliferating rapidly around the world. To date, there are 268 wireless carriers in 110 countries who have deployed one of the 3G CDMA technologies. Worldwide, there are over 441 million subscribers using a 3G CDMA device, and these devices are proliferating at a very rapid rate in the hotly competitive wireless markets

around the world. In the last 12 months alone, 93 devices using 3G CDMA have been brought to market by 28 different device manufacturers.

Here in the United States, there is fierce competition among the carriers in the provision of 3G services, which has gone hand-in-hand with the rapid deployment and expansion of 3G CDMA networks. As a result, American consumers are enjoying the 3G services at ever-increasing rates. Moreover, as the Commission found in its Eleventh Report, U.S. carriers have deployed competing 3G technologies, which has only intensified the competition as the carriers seek to differentiate their networks by providing what each claims to be the best and most advanced high speed wireless network and by offering the most robust and compelling 3G services to consumers. Accordingly, Verizon Wireless, Sprint, ALLTEL, US Cellular, and Leap Wireless, among other carriers, have deployed the EV-DO high speed wireless technology, and their deployments are expanding. As of September 2006, approximately two-thirds of the U.S. population had access to EV-DO, and since then, the competing EV-DO networks have substantially expanded their footprints.[3] As of March 31, 2007, over 23 million Verizon Wireless subscribers, more than 39 percent of that carrier's retail customers, have an EV-DO device. Indeed, Verizon Wireless and Sprint are now in the midst of rapidly upgrading their EV-DO networks to an advanced version of EV-DO, known as Revision A, which supports very high speed downloads and uploads.

On the other hand, Cingular Wireless has deployed the competing WCDMA/HSDPA technology, and it is expanding the footprint of its WCDMA/HSDPA network at a very rapid rate. Moreover, Cingular has announced its intention to upgrade its network to HSUPA, an advanced version of the HSPA technology, which also supports very high speed downloads and

[3] See Eleventh Report at Statement of Chairman Martin.

uploads. Moreover, both T-Mobile USA and Sprint provide high speed local area service via Wi-Fi (802.11) technology, and T-Mobile has announced its intention to deploy WCDMA on its recently purchased AWS-1 spectrum as it becomes clear and available for deployment. In addition, the 3G CDMA technologies are now embedded in laptops sold by the major laptop vendors offering consumers another way to access mobile broadband services.

Less than a year ago, the Commission conducted its most successful auction ever, the auction of the so-called AWS-1 spectrum, which raised over $13.7 billion. The auction gave two new players nationwide spectrum footprints, T-Mobile USA, as noted above, and SpectrumCo, a newly formed company controlled by a consortium of cable television operators. The auction also enabled other new entrants to gain spectrum footprints. Indeed, the winner of the greatest number of licenses in the AWS-1 auction, among all high bidders, was a wholly-owned subsidiary of the new NextWave, a company that has announced plans to deploy mobile WiMAX technology.

II. The Commission Has Found That There Is Robust Competition in the U.S. Wireless Market

In adopting final rules to govern the auction of the remaining 700 MHz commercial spectrum and the operations on all of the 700 MHz commercial spectrum, QUALCOMM asks the Commission bear in mind its own recent findings on the state of competition in the U.S. wireless industry. Each year, as required by Congress, the Commission renders a report on the state of competition in the U.S. wireless (commercial mobile radio) market. The Commission released its most recent report, the Eleventh Report, on September 29, 2006. The Commission summarized its findings in the Eleventh Report as follows:

> In this report, the Commission concludes that there is effective competition in the CMRS marketplace. Among the indicators of market structure that support this conclusion, 98 percent of the total U.S. population lives in counties with access

> to three or more different operators offering mobile telephone service, slightly higher than in the previous year, and up from 88 percent in 2000, the first year for which statistics were kept. The percentage of the U.S. population living in counties with access to four or more different mobile telephone operators is also slightly higher than in the previous year.

Eleventh Report at para. 2. Indeed, the Commission found that the U.S.wireless market is less concentrated than in Western European markets, with the exception of the UK. Id. at para. 52.

After acknowledging the consolidation as a result of the Sprint-Nextel and Cingular-AT&T Wireless mergers, the Commission concluded that:

> Nevertheless, although the mobile telephone market has become more concentrated as a result of these mergers, none of the remaining competitors has a dominant share of the market, and the market continues to behave and perform in a competitive manner.

Id. at para. 2. The Commission also found that despite consolidation, existing carriers continue to expand and enter new markets. Id. at para. 84.

Since the Eleventh Report was issued, the Commission completed the AWS-1 auction, the largest and most successful auction in the history of the Commission. One of the largest winners of the auctioned AWS spectrum is a new entrant whose voting stock is owned by cable television operators, who have expressed interest in offering innovative services. The Commission itself stated in its Eleventh Report that it expects that the AWS-1 auction will facilitate entry into local markets by existing carriers and possibly by new entrants. Id.

The Commission's conclusion that the wireless market is highly competitive is not limited to particular parts of the country. To the contrary, with respect to the state of competition in the wireless industry in rural areas, the Commission concluded as follows:

> Based on our rollout analysis, information, and statements provided by commenters, and industry reports, we conclude that CMRS providers are competing effectively in rural areas. In addition, some analysts report that wireless competition is increasing in rural areas, particularly as a wireline substitute.

Id. at para. 88.

The Commission went on to state that:

> We note that market structure is only a starting point for a broader analysis of the status of competition based on the totality of the circumstances, including the pattern of carrier conduct, consumer behavior, and market performance more fully discussed below. Despite the smaller number of mobile operators in rural areas as compared to urban areas, there is no evidence in the record to indicate this structural difference has enabled carriers in rural areas to raise prices above competitive levels or to alter terms and conditions of service to the detriment of rural consumers. To the contrary, one analyst found that rural carriers are rolling out competitive national pricing plans with "surprisingly low per minute pricing."

Id.

Furthermore, with respect to the conduct of the nation's wireless carriers, the Commission found the following:

> With respect to carrier conduct, the record indicates that competitive pressure continues to drive carriers to introduce innovative pricing plans and service offerings, and to match the pricing and service innovations introduced by rival carriers.

Id. at para. 3.

Indeed, the Commission noted that with respect to 3G, this competition is heightened by the fact that carriers have deployed different 3G technologies. As the Commission put it:

> In addition, the deployment of next-generation networks based on competing technological standards continues to be an important dimension of non-price rivalry in the U.S. mobile telecommunications market.

Id.

The Commission went on to explain the basis for its conclusion as follows:

> Theory and evidence suggest that allowing the use of multiple standards may have several advantages over standardization of wireless network technologies. Since the types of services tend to differ across technologies, use of multiple standards may result in greater product variety and greater differentiation of services offered by carriers using different technologies. Diversified and heterogeneous services make it more difficult for carriers to coordinate their behavior so as to restrict competition with regard to pricing. Other potential pro-competitive advantages of multiple standards include greater technological competition and greater price competition between operators using different technologies. In

> particular, competition between carriers using incompatible technologies tends to put pressure on carriers to achieve sufficiently high adoption of their technology in order to ensure that it survives the "standards war." The pressure to fill their networks may lead carriers to enact price cuts and handset subsidies. Finally, the adoption of a particular standard may enable one carrier, or a subset of carriers, to gain a temporary competitive advantage over rival carriers, which may also tend to undermine the incentive and the ability of carriers to coordinate their conduct in such a way to restrict competition.

Id. at para. 102.

Indeed, the Commission noted the proliferation of the competing 3G network technologies. As of the date of issuance of the Eleventh Report, the Commission wrote that CDMA 1xRTT and/or EV-DO was launched in at least some portion of counties containing 283 million people, which is 99 percent of the U.S. population. Id. at para. 117. On the other hand, GPRS, EDGE, or WCDMA/HSDPA was launched in at least some portion of counties containing 269 million people, or 94 percent of the U.S. population. Id. Moreover, the Commission noted the plans of Sprint Nextel, Clearwire, and others to deploy networks employing mobile WiMAX technology. Id. at paras. 119-120.

Moreover, the Commission found that other factors, including most notably the ability and penchant of consumers to change wireless carriers, is another factor that establishes that the wireless market is intensely competitive. The Commission explained this conclusion as follows:

> Consumers continue to pressure carriers to compete on price and other terms and conditions of service by freely switching providers in response to differences in the cost and quality of service. Monthly churn rates averaged about 1.5 to 3.0 percent per month in the past year. In addition, implementation of local number portability ("LNP") beginning in November 2003 has lowered consumer switching costs by enabling subscribers to keep their phone numbers when changing wireless subscribers.

Id. at para. 4.

The Commission also concluded that the prices themselves charged by mobile carriers show that the wireless market is highly competitive. The Commission summarized that conclusion in this way:

> Evidence on mobile pricing trends remains somewhat mixed, with two different indicators of mobile pricing—revenue per minute and the cellular Consumer Price Index ("CPI")—continuing to show a decline in the price of mobile telephone service, and a third indicator based on the consumption patterns of hypothetical users showing a slight increase in the cost of mobile phone service in 2005. Nevertheless, international comparisons indicate that mobile voice calls are still far less expensive on a per minute basis in the United States than in Western Europe and Japan.

Id. at para. 5.

In sum, after a thorough analysis, consuming some 93 single spaced pages, the Commission concluded in the Eleventh Report that indicators of mobile market performance, carrier conduct, and market structure all "show that competition in the mobile telecommunications markets is robust." Id. at para. 214. QUALCOMM respectfully submits that the Commission should take heed of this important finding in fashioning rules for the auction of, and operation on, the 700 MHz commercial spectrum. The Commission has itself determined that the US wireless market is robustly competitive. The Commission should not adopt rules for the 700 MHz auction and operations on the 700 MHz band that reflect the competitive nature of the market. There is no need or basis for the Commission to micromanage the auction or the 700 MHz spectrum on a mistaken belief that there is a lack of competition.

III. The Commission Should Not Restrict Eligibility for the 700 MHz Auction or Adopt Regulations to Mandate or Forbid Particular Business Models

The FNPRM seeks comment on a host of proposals which are all premised on the mistaken belief that there is a lack of competition in the US wireless market. These proposals entail a radically different and far more invasive regulatory approach than the one that the

Commission has used toward the US wireless industry for quite some time, with great success for the American public. Based on the Commission's own conclusion that the US wireless industry is robustly competitive, QUALCOMM urges the Commission to reject these proposals. There is no basis for the Commission to adopt a new generation of far reaching regulations to affect social or economic policy problems that do not exist. We address these proposals below, one-by-one.

A. Eligibility Restrictions

The FNPRM seeks comment on a proposal to deem incumbent local exchange carriers, incumbent cable operators, and large wireless carriers ineligible for licenses for all or part of the 700 MHz band; to deem such entities eligible only if they hold licenses through structurally separate affiliates; to restrict eligibility for the Upper 700 MHz C Block to entities not affiliated with incumbent wireline broadband service providers, including DSL and cable providers, or parties not affiliated with in-region wireline broadband service providers; or, whether the Commission should award bidding credits to applicants who are unaffiliated with incumbent wireline broadband service providers. FNPRM at para. 221.

These proposals all assume that there is a lack of competition in the US wireless market, specifically that ownership of new spectrum by parties affiliated with incumbent local exchange carriers, incumbent cable operators or large wireless carriers will harm the public. There is no empirical basis (or any other real basis) for this assumption. To the contrary, as the Commission itself found in the Eleventh Report, the US wireless market is robustly competitive, and that competition extends to all sectors of the market. Prices are down, and use of wireless services is at record levels. The Commission cannot just pretend that this is not the case and assume a competitive problem that does not exist. FCC auctions have succeeded in the past by awarding

spectrum to those parties who value the spectrum most highly and, therefore, have the greatest incentive in using the spectrum to provide service to the public as quickly as possible. By contrast, those auctions which have proven to be problematic, the PCS C Block for example, are those in which the Commission has adopted rigid eligibility rules and instead imposed articificial eligibility restrictions of the type under consideration here. Again, the Commission cannot just overlook that history.

The AWS-1 auction, again the most successful in the Commission's history, provides a good example of why the Commission need not adopt eligibility restrictions. The AWS-1 spectrum licenses were won by a mix of new entrants, existing carriers, and designated entities. Parties were able to win national, regional, and local footprints, as they wished. Open eligibility in that auction raised billions of dollars in the auction and will result in an even more competitive wireless industry, with significant amounts of spectrum won, for example, by T-Mobile USA, an existing carrier not affiliated with any incumbent local exchange carrier or cable operator; SpectrumCo, which is affiliated with cable operators; and, NextWave, a new entrant. The AWS-1 auction shows that what has always been true with respect to FCC auctions remains the case: when the Commission auctions spectrum to all comers, free of eligibility restrictions, the spectrum is won by a host of different bidders-- some large and some small, some with national ambitions and some with regional or local ambitions, and some existing players and some new entrants. Marketplace forces produced results which will enhance, not reduce, competition.

For all of these reasons, the Commission should not adopt eligibility restrictions for the 700 MHz auction or in the secondary market. Marketplace forces will continue to work and bring even more competition to an already competitive US wireless market. In fact, excluding certain parties from holding 700 MHz spectrum is likely to reduce the proceeds of the auction

and to delay service to the public on this important new spectrum. The Commission should allow all parties to bid and hold this spectrum so that the high bidder is truly the party who values the spectrum the most and is therefore most likely to use the spectrum as quickly as possible to provide service to the public.

B. "Open Access" Requirements

The FNPRM seeks comment on a proposal by Frontline Wireless, referencing a petition recently filed with the Commission by Skype, that the licensee of the proposed E Block be required to operate with a so-called "open access" model—i.e., to allow attachment of any device to its wireless network and to permit users access to services and content by unaffiliated parties—an a proposal by a "public interest" group to extend this requirement to 30 MHz of the 700 MHz spectrum. FNPRM at para. 275, 276, 290. QUALCOMM opposes these proposals, just as QUALCOMM opposed Skype's Petition.[4]

These proposals, once again, seek Commission regulation premised on an assumption that there is a lack of competition in the US wireless industry, a market failure that necessitates governmental intervention. These assumptions are false, as the Commission's own recent report on competition thoroughly establishes. There is no market failure in the US wireless market. The market is robustly competitive, as the earlier quoted passages from the Commission's Eleventh Report found. If Frontline or others wish to adopt this "open access" business model on spectrum they win in the auction, they would be free to do so under existing Commission rules, which leave such matters to the competitive wireless market. The question posed in the FNPRM is whether the Commission should mandate this "open access" model, and there is simply no basis for the Commission to do so.

[4] See Opposition of QUALCOMM Incorporated, RM-11361, filed April 30, 2007.

As QUALCOMM and others established in their oppositions to Skype's Petition[5], the US market for wireless in general, and for wireless devices and services in particular, is incredibly competitive in the absence of any such mandate. Moreover, wireless carriers have legitimate needs to approve devices before they are used on their networks—to protect tens of millions of subscribers, not to mention billions of dollars in investment, from viruses that could bring down a wireless network, in whole or in substantial part. Wireless carriers have limited network capacity, since they operate on a finite amount of spectrum, and it is entirely appropriate for carriers to establish fully disclosed restrictions on use to ensure that the ability of a carrier's entire subscriber base to use the network are not affected by a bandwidth hogging few. Wireless handsets are technically integrated with a wireless network, and so it is entirely appropriate for carriers to approve devices prior to their use to ensure that the devices do not cause interference or a degraded quality of service. Finally, it would be impossible for the Commission to enforce its E911 and HAC (hearing aid compatibility) mandates if the Commission were to require the "open access" business model.

The record on Skype's Petition amply demonstrates a host of problems—technical, practical, legal, and more—that would ensue if the Commission were to mandate "open access." Surely, such a radical change in regulatory philosophy cannot be made based upon an erroneous assumption as to a lack of competition or without any real answer to why these substantial problems will not occur. The Commission has no basis for adopting an "open access" mandate. Once again, the Commission should let marketplace forces work and auction the 700 MHz spectrum without mandating an untested, radical business model which existing participants in the industry have all roundly opposed.

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[5] See Oppositions filed by AT&T, MetroPCS, Sprint Nextel, T-Mobile USA, United States Cellular Corporation, Verizon Wireless, Motorola, and LG Electronics MobileComm USA.

C. Requirements to Offer Wholesale Service

The Commission has also sought comment on a proposal made by Frontline that would require the licensee of its proposed E Block to offer service on a wholesale basis; Frontline's proposal is apparently that the E Block licensee would be permitted to offer only wholesale service. See FNPRM at paras. 275, 290; Comments of Frontline Wireless in WT Docket No. 06-150 (filed March 6, 2007) at Pgs. 8, 18, 19. This proposal asks the Commission to mandate and prohibit particular business models, a sweeping new regulatory mandate which is totally inconsistent with a robustly competitive market. Again, under existing FCC rules, Frontline or others could operate with a wholesale or a wholesale-only business model; the question presented by the FNPRM is whether the Commission will take the unprecedented step of mandating a wholesale or wholesale-only business model and forbidding other business models.

The Commission should not impose such a mandate. One critical reason why the American wireless market has flourished is that the Commission has not involved itself in the business models of wireless carriers. Indeed, the Commission, a regulatory agency, is not situated to dictate business models in today's rapidly changing wireless market. For the Commission to do so now, in the face of an intensely competitive market, with carriers offering wholesale and retail services to varying degrees based on their own business models, would not make any sense. There is no data suggesting in any way a marketplace failure which would require the Commission to mandate a wholesale model or to forbid a retail model.

In sum, the Commission should not dictate business models. Rather, the Commission should do what it does best—establish a set of flexible rules that allow licensees to determine how they wish to use their spectrum and conduct an auction in which all comers can bid and in which the high bidders win the licenses. This is the regulatory paradigm that the Commission

has used successfully in the past—this paradigm has helped create a wireless industry that is the envy of the world. The Commission should not try to determine, based on its own judgment, which business model is "best."

D. Command and Control Regulations Dictating the Provision of Specific Permitted Services and Prohibiting Other Services

Finally, recently, well after issuance of the FNPRM, Google filed an ex parte notice in which Google stated, without any basis whatsoever, that it appears that there is "no significant immediate commercial value" for 722-728 MHz, the 6 MHz unpaired E Block spectrum in the Lower 700 MHz Band in the band plan which the Commission has tentatively decided to adopt because, according to Google, of the relatively limited bandwidth and the unpaired nature of the block. As a result, Google proposes that the Commission require that the Lower 700 MHz E Block be used only for interactive, two-way broadband services connected to the public internet and used to support innovative software-based applications, services, and devices. See May 21, 2007, Ex Parte Notice of Google, WT Docket Nos. 06-150, 06-229 and 96-86. This request seeks to have the Commission to dictate which services may be deployed on the Lower 700 MHz E Block, thereby jettisoning decades of spectrum regulation during which time the Commission has gotten out of the business of dictating which services can and cannot be deployed on particular spectrum. .

In making this radical proposal that the Commission only permit a very narrow specified use of this Lower 700 MHz spectrum block, Google is five years too late. In January 2002, the Commission reallocated the Lower 700 MHz Band for fixed and mobile services. In doing so, the Commission wrote as follows as to the flexibility of the new allocation:

> The flexible allocation we adopt for the Lower 700 MHz Band will allow service providers to select the technology they wish to use to provide services that the market may demand.

In the Matter of Reallocation and Service Rules for the 698-746 MHz Spectrum Band, (Television Channels 52 to 59), 17 FCC Rcd 1022, 1023 (2002).

The Commission got it right in 2002, and there is absolutely no reason to reverse course now. The Commission should not decide which particular services are permissible on any portion of the 700 MHz spectrum and bar all other services. Rather, the Commission should follow the flexible allocation it made in 2002, and allow the licensees to decide which services to offer. This is no time to return to command and control spectrum regulation, a regulatory model that the Commission abandoned long ago.

IV. The Commission Should Enable Public Safety to Have Access to Interoperable High Speed Wireless Broadband Service on the 700 MHz Public Safety Band

QUALCOMM has long maintained that America's first responders should have access to a nationwide interoperable, high speed, wide area wireless broadband network, the kinds of innovative devices that operate on such a network, and the full panoply of state-of-the-art wireless broadband applications, including video surveillance, real-time text messaging and email, and high resolution digital video downloads. These tools are available today in the commercial wireless market, which is driven by constant technological innovation. By leveraging the economies of scale and competitive dynamics in that market, public safety agencies can use these highly beneficial services on a wireless broadband network dedicated to public safety. QUALCOMM supports the Commission's tentative conclusion to re-channelize the 700 MHz public safety band to create two blocks of 5 MHz each for broadband service, separated by guardband of 1 MHz each to prevent interference from or to adjacent narrowband services. See FNPRM at paras. 256, 257. This arrangement will result in far more efficient use

of the spectrum than if the broadband segment is placed in between 3 MHz narrowband segments.

Creation of a 5 MHz Block for public safety will allow for the choice of technologies, including the 3G CDMA technologies described supra. Public safety agencies already use these technologies today. Most recently, the National Capital Region, which is composed of public safety agencies in 18 jurisdictions, including the District of Columbia and portions of Maryland and Virginia. Began deploying the EV-DO Revision A ("DOrA") technology, which is well suited to meet public safety's unique needs. EV-DO optimizes a 1.25 MHz channel for high speed wireless data communication. By dividing an allocation into separate voice and data channels, using EV-DO for data improves overall network efficiency and eliminates the chance that an increase in voice traffic will cause data rates to drop. DOrA supports peak downloads of 3.1 megabits per second and peak uploads of 1.8 megabits per second. It also supports mobile voice over internet protocol. The Commission's tentative conclusion in the FNPRM, if adopted, would reconfigures the 700 MHz public safety band so that it can be used for this state-of-the-art wireless technology.

It is important to note that there is a wide and deep ecosystem supporting the EV-DO and WCDMA/HSPA technologies into which public safety could tap for devices, applications, and services. As noted supra, QUALCOMM broadly licenses its intellectual property in CDMA. In all, QUALCOMM has licensed 98 manufacturers to sell CDMA-based subscriber products, 40 manufacturers to sell CDMA-based infrastructure equipment, 12 manufacturers to sell CDMA component products, and 19 manufacturers to sell CDMA test equipment.[6] These licensees include virtually every major manufacturer in the wireless telecommunications market. The

[6] A complete list of these licensees is available at: http://www.qualcomm.com/technology/licensing/index.html.

result of this licensing program is that the market for CDMA-based equipment is robust and extremely competitive.

With respect to 1xEV-DO-based products, for example, 160 different EV-DO devices, including PDAs, smartphones, laptops with 1xEV-DO embedded inside, and mobile phones, have been brought to market by 25 manufacturers. In particular, five manufacturers of laptop computers now sell laptops with EV-DO embedded inside the laptops, and there twenty five different models of EV-DO embedded laptops on the market.

The next sections of this pleading compare broadband technology to wideband technology, a comparison that QUALCOMM has made in prior filings with the Commission but which it now makes in light of the FNPRM's tentative conclusion not to allow wideband operations in the reconfigured broadband block, and discuss the considerations relating to interoperability.

A. Broadband Delivers Data Much Faster Than Narrowband and Provides Much Better Coverage

EV-DO does deliver data faster than the SAM wideband technology by several orders of magnitude. In fact, however, as QUALCOMM has shown in prior filings, if one assumes comparable throughput and capacity, the coverage provided by EV-DO is better than SAM. The following analysis, which is based on assuming the same radio parameters (transmitter power, noise figures, antenna height and type, etc.) for EV-DO and SAM, supports QUALCOMM's conclusions.

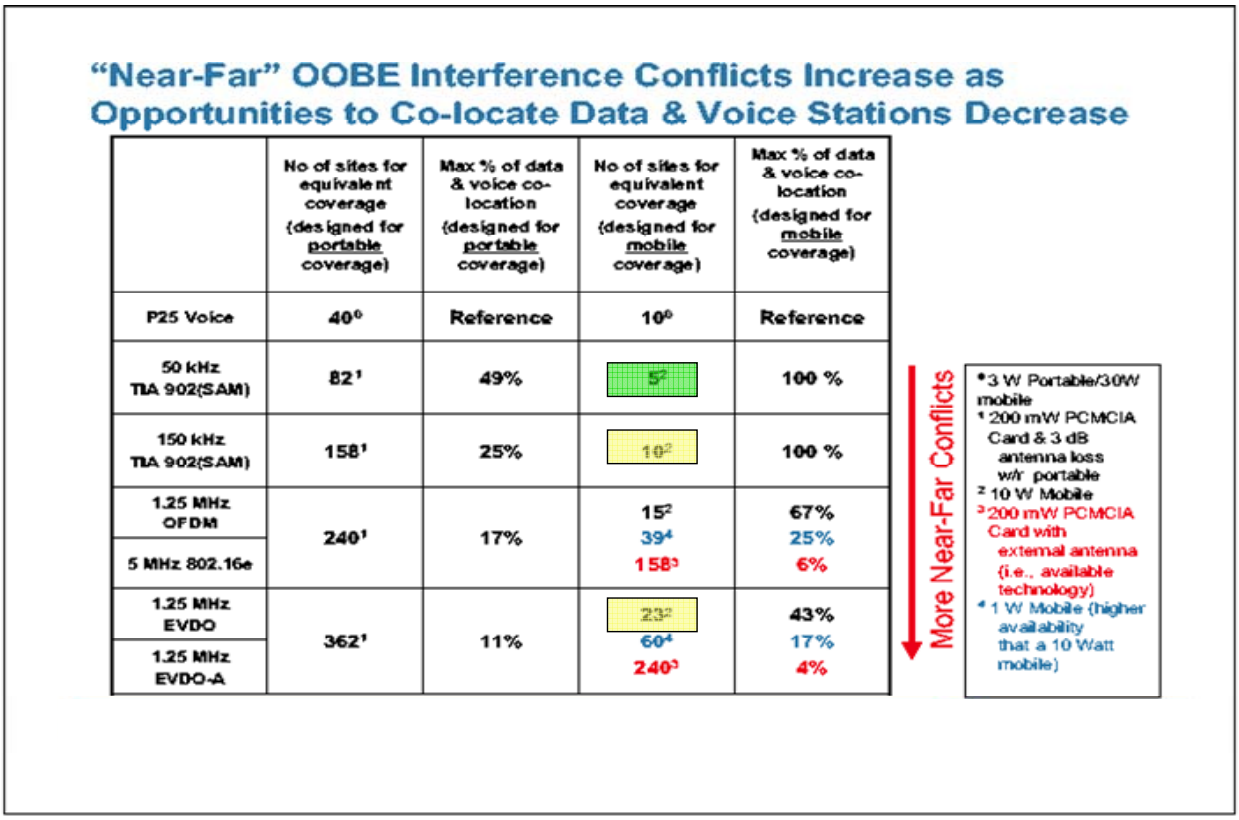
Since EV-DO uses 1/1 frequency reuse, in order to achieve a certain SNR at the base station, the access teminal (AT) has to transmit at a power that is RoT (dB) higher than what would be needed in an interference free case. RoT is the reverse link (RL) rise-over-thermal. We assumed a RoT close to 6dB, which was implied in a prior filing by Motorola; however, the

operating RoT, even at full RL capacity, is often much less than 6 dB and at a capacity equal to SAM. If the propagation loss can be expressed as $L = B \cdot d^{\gamma}$, where d is the distance from the AT to the base station, then the maximum coverage distance for an interference free system is $\text{lin}(RoT / \gamma)$ times more than that for EV-DO. With $\gamma = 3.5$,[7, 8] we have a coverage ratio of 1.48, which would result in a required number of cell site ratio of $1.48^2 = 2.2$.

This result approximately matches certain data points found in Motorola's filing of October 26, 2005. Specifically, the numbers highlighted in yellow in the table below reflect a factor of 2.3 between the required number of cell sites for EV-DO and SAM 150kHz.

[7] COST231 Hata Urban Propagation Model, BS antenna height 32m, AT antenna height 1.5m

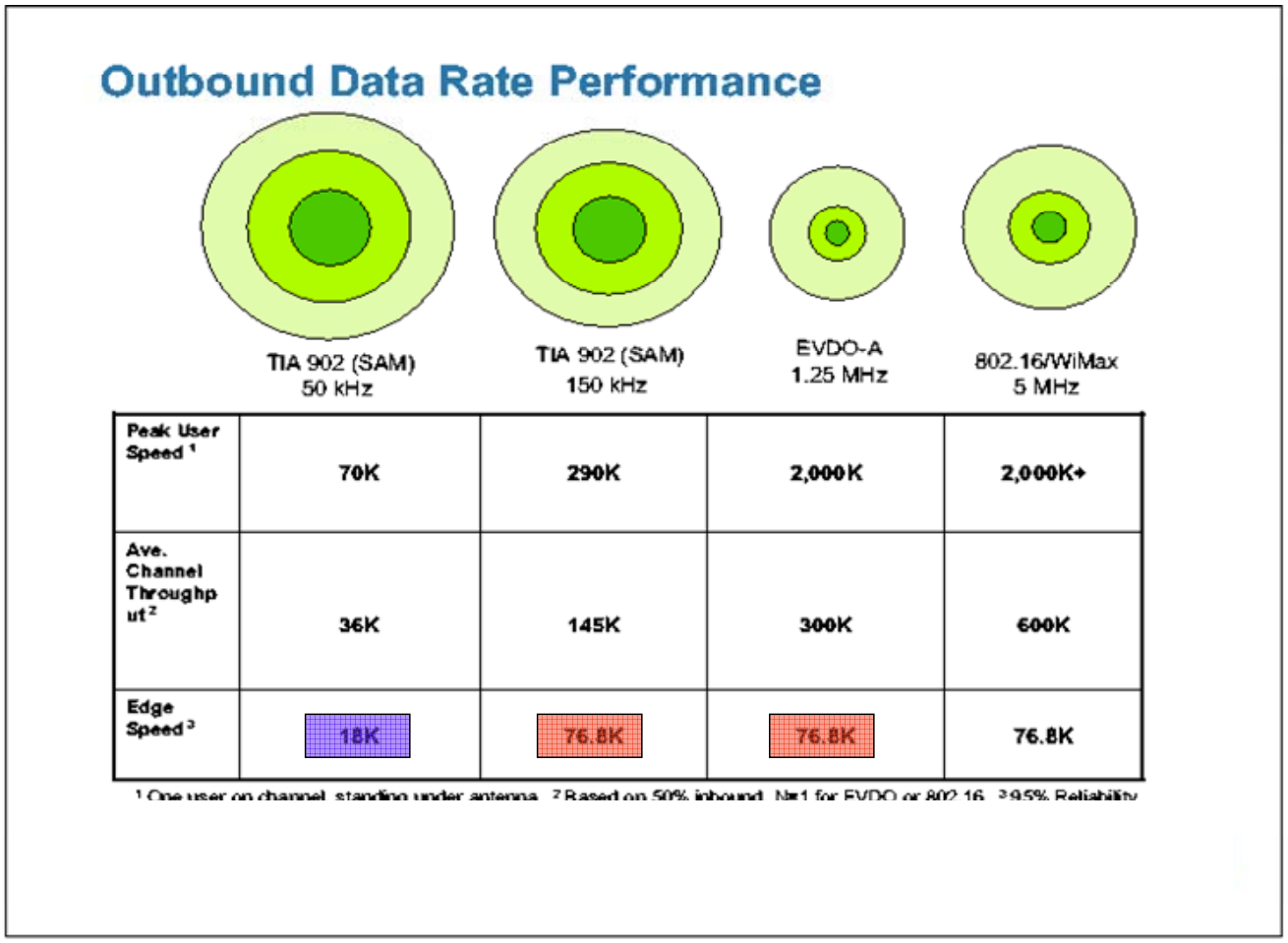
[8] The data in Motorola's October 26, 2005 ex parte filing appears to assume $\gamma = 3.32$ instead of $\gamma = 3.5$



QUALCOMM submits that in considering the figures in the preceding table, which appears in Motorola's ex parte filing, only values corresponding to the same AT power should be considered. For example, it makes little sense to compare a mobile with 5 W transmission power with those with 10 W transmission power. Moreover, the table ignores the capacity of the various systems. To achieve equal capacity in a SAM 150 KHz system as an EV-DO system, the SAM system would need many more cell sites than the EV-DO system, which drives up the cost of the SAM system and increases the interference, as already shown herein. An appropriately configured EV-DO network can achieve the same coverage as SAM 150 KHz, and the EV-DO network will still have better throughput.

Motorola's data in the above chart and elsewhere in their October 26, 2005 filing purporting to compare 1.25 MHz EV-Do and 5 MHz 802.16e cannot be validated. In slide 33 of that filing, they compare peak user speed and data throughput of 1.25 MHz EV-DO and 5 MHz 802.16e, as they did in the above chart. It appears that neither chart normalizes the two air interfaces to the same bandwidth.

With respect to their comparison of SAM and EV-DO, any such comparison should be based on assuming equal AT power capabilities. We then begin by selecting an appropriate rate that is to be supported by a user at the edge of coverage. Based on the data in the Table below from Motorola's filing, we use 76.8kbps (highlighted in red). Often smaller data rates are assumed for edge of coverage users; but if we used less than 76.8 kbps in this analysis, then the results would turn even more favorable to EV-DO.



We then make the following assumptions:

1. Only the RL is considered, because coverage is typically RL limited due to the smaller AT Tx power relative to the base station.

2. RL data rate of 76.8kbps is assumed

3. It is assumed that the EV-DO and SAM ATs have the same power limit

4. It is assumed that that the path loss to the base station is the same for EV-DO and SAM

5. For SAM, a frequency reuse of 1/5 is assumed, because this was implied in slide 29 in the Motorola ex parte filing. The range is reduced due to increased interference, which is

inevitable as the reuse factor is reduced. It is possible to use higher reuse, such as 1/3 but that would further reduce coverage for SAM.

6. It is assumed that SAM is completely interference free (which is quite optimistic).
7. A noise figure of 5dB is assumed for both the EV-DO and SAM base station receivers.

With the above assumptions, we derive the following. With a frequency reuse of 5, there are approximately 1.25MHz / (5 * 150kHz) = 1.67 SAM 150kHz carriers per a EV-DO carrier. Therefore, if the edge of coverage rate is 76.8kbps, then the SAM throughput is 1.67 * 76.8kbps = 128.3 kbps served by a given sector in a unit of 1.25MHz bandwidth. To make a reasonably equivalent EV-DO comparison, we assume that a EV-DO sector with frequency reuse 1/1 receives data from two edge-of-coverage users, one with data rate 76.8kbps (call it AT_a), and another one (call it AT_b) with 128.3kbps – 76.8kbps = 51.5kbps. This way, the total throughput and the number of users served are comparable between the EV-DO and SAM cases under consideration.

Using information from the EV-DO AN Minimum Performance Specification[9], in order to receive 76.8kbps data rate from an AT in various fading environments, the received $\hat{I}_{or}/I_o$ must be about -7dB. This means that the received power from AT_a must be about $1/5^{th}$ of the total received power by the base station. In a power limited scenario, such as the one considered here, we can assume linear scaling, therefore for AT_b the required $\hat{I}_{or}/I_{oc}$ would be -8.7dB. By using the basic CDMA equations for the SNR, we can make the following approximations:

[9] C.S0032-A v1.0 Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Network, December 2005.

$$\hat{I}_{or}/I_o\Big|_{AT_a} = \frac{\hat{I}_{or}\Big|_{AT_a}}{(\alpha-1)\cdot\left(\hat{I}_{or}\Big|_{AT_a} + \hat{I}_{or}\Big|_{AT_b}\right) + \hat{I}_{or}\Big|_{AT_b} + N_o} \quad (1)$$

$$\hat{I}_{or}/I_o\Big|_{AT_b} = \frac{\hat{I}_{or}\Big|_{AT_b}}{(\alpha-1)\cdot\left(\hat{I}_{or}\Big|_{AT_a} + \hat{I}_{or}\Big|_{AT_b}\right) + \hat{I}_{or}\Big|_{AT_a} + N_o} \quad (2)$$

Where α is the increase in interference due to other cells relative to same cell interference. We will assume $\alpha = 1.6$ based on Viterbi's treatise on spread spectrum.[10]. Implicitly, we also assume similar loading in all neighboring cells.

By simultaneously solving Eq (1, 2), we get:

$$\hat{I}_{or}\Big|_{AT_a} = 0.306 \cdot N_o$$
$$\hat{I}_{or}\Big|_{AT_b} = 0.216 \cdot N_o$$

The point we are making here is that EV-DO can achieve a throughput equivalent to the throughput achievable with SAM for edge of coverage users, with a RoT of only $\alpha \cdot \left(\hat{I}_{or}\Big|_{AT_a} + \hat{I}_{or}\Big|_{AT_a}\right) + N_o = 2.6\text{dB}$. Therefore, a RoT = 6dB figure, which appears to have been used in Motorola's filing, and which corresponds to an EV-DO network configuration of much higher capacity than SAM, was not a reasonable basis for comparison. Recall that we assumed 0 dB interference margin for SAM, which, as noted, is optimistic and which makes it even less reasonable.

At this point, we can calculate the minimum received power at the EV-DO base station required for a 76.8kbps RL data rate. For this, we use a thermal noise floor of -174dBm/Hz and a receiver noise figure of 5dB. With these, we have

[10] Principles of Spread Spectrum Communication, Andrew J. Viterbi, Addison-Wesley, 1995.

$$\hat{I}_{or}\Big|_{AT_a} = 10\log_{10} 0.306 - 174 + 10\log_{10}(1.25 \cdot 10^6) + 5 = -113.2\text{dBm}$$

Since the EV-DO reverse link is power controlled, we need to add headroom to the above figure in order to account for power control variations. Since every EV-DO base station employs receive diversity, a 4dB headroom is sufficient, therefore we have

$$\hat{I}_{or\_min} = \hat{I}_{or}\Big|_{AT_a} + 4\text{dB} = -109.2\text{dBm}$$

Now we have to derive what the SAM 150kHz throughput would be at $\hat{I}_{or} = -109.2\text{dBm}$. The SAM minimum performance specification[11] has fading channel demodulation requirements copied in the table below, but unfortunately, the lowest $\hat{I}_{or}$ level used for SAM 150kHz is -94dBm (highlighted in red), at which the tested data rate is 211kbps. Furthermore, the test is evaluated based on uncoded BER, so the comparison would not be meaningful.

Table 5 TU50 Fading Profile

				Receiver Input Level		
Assigned Bandwidth	Modulation Type	Faded BER	Time Interval (ms)	Mobile (dBm)	Portable (dBm)	Base Station (dBm)
50 kHz	64-QAM	1%	320	-86	-86	-87
	16-QAM	1%	320	-92	-92	-93
	QPSK	1%	320	-97	-97	-98
100 kHz	64-QAM	1%	320	-83	-83	-84
	16-QAM	1%	320	-89	-89	-90
	QPSK	1%	320	-94	-94	-95
150 kHz	64-QAM	1%	320	-83	-83	-83
	16-QAM	1%	320	-89	-89	-89
	QPSK	1%	320	-94	-94	-94

[11] See n.8, supra.

We made a comparison based on the data in O'Hara's publication on 700 MHz wideband data.[12] The relevant table from that publication is copied below. The data in this table is for SAM 50kHz, so first we have to convert to SAM 150kHz. Since the studied case corresponds to a power limited scenario, it is reasonable to increase the data rates in the table below by a factor of 3, and also to increase the required power by 5dB in order to model SAM 150kHz. Because the table is for the SAM FL, the data is somewhat optimistic for SAM given that it ignores some of the overhead associated with the SAM RL.

It appears that the table assumes a 9dB receiver noise figure. In order to keep a level comparison with EV-DO, where we assumed a noise figure of 5dB, we will compensate by adding 4dB to the calculated received power for SAM.

Symbol Es/No	Power dBm	SAM Throughput (kbps), 50 kHz Channel Width				
		QPSK 1/2	16QAM 1/2	64QAM 2/3	64QAM	MAX
0	-116.01	4.14	0.00	0.00	0.00	4.14
4	-112.01	13.80	0.00	0.00	0.00	13.80
8	-108.01	20.70	19.32	0.00	0.00	20.70
12	-104.01	25.12	35.88	0.00	0.00	35.88
16	-100.01	27.05	48.02	33.12	0.00	48.02
20	-96.01	27.49	53.88	66.24	0.00	66.24
24	-92.01	27.59	54.87	93.84	0.00	93.84
28	-88.01	27.60	55.17	103.78	0.48	103.78
32	-84.01	27.60	55.20	107.97	12.58	107.97
36	-80.01	27.60	55.20	109.74	49.17	109.74
40	-76.01	27.60	55.20	110.21	84.83	110.21
44	-72.01	27.60	55.20	110.37	105.73	110.37
	GROSS	76.80	153.60	230.40	230.40	230.40
	NET	67.20	134.40	201.60	201.60	201.60
	N/G	87.50%	87.50%	87.50%	87.50%	87.50%
	MaxT/G	35.94%	35.94%	47.90%	45.89%	47.90%
	AVET	23.66	40.66	61.27	21.07	68.72

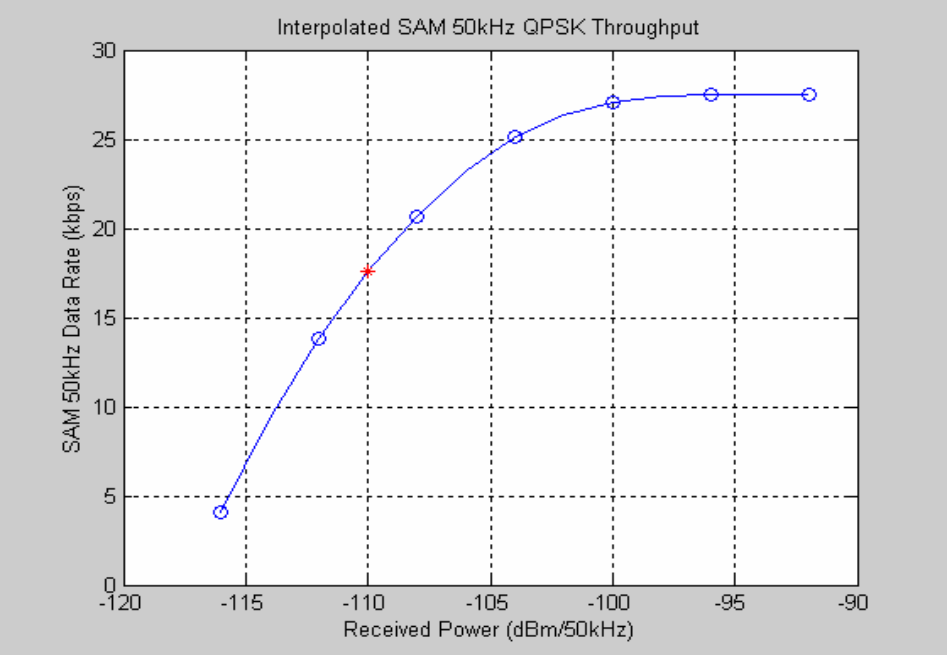
Based on the arguments above, the SAM receiver would see

$$\hat{I}_{or} = -109.2\text{dBm} + 4\text{dB} - 5\text{dB} = -110\text{dBm}/50\text{kHz}$$

[12] 700 MHz Wideband Data Loading Factors, Sean O'Hara, Syracuse Research Corporation.

where the 4dB term accounts for the different noise figure assumptions and the 5dB term accounts for the 150kHz to 50kHz conversion.

Since there is no entry in the table above for –110dBm power, we need to interpolate between the (–108dBm, 20.7kbps) and (–112dBm, 13.8kbps) data points for QPSK. The interpolation is based on the figure below, which was derived from the 3rd column of the SAM throughput table above.



With interpolation to –110dBm, we get (–110dBm, 17.6kbps) per 50kHz, so in SAM 150kHz, we could expect to have 3*17.6kbps = 53kbps.

This compares with 76.8kbps data rate in the same edge of coverage situation for EV-DO. Therefore the cell edge data rate in DO is about 45% higher.

Often, the edge of coverage throughput is determined while assuming an unloaded system. In this case, the only source of interference to the received signal is thermal noise. This is the same assumption as was used so far for SAM.

In the unloaded system case, we can calculate the EV-DO required received power for 76.8kbps as

$$\hat{I}_{or}\Big|_{AT} = \frac{\hat{I}_{or}}{I_o} - 174 + 10\log_{10}(1.25\cdot 10^6) + k$$

where $\frac{\hat{I}_{or}}{I_o} = -7\text{dB}$ is the EV-DO minimum performance requirement for the 76.8kbps data rate and $k = 5\text{dB}$ is the base station receiver noise figure. With these, we get

$$\hat{I}_{or}\Big|_{AT} = -115\text{dBm}.$$

Again, with adding a 4dB power control headroom, we get

$$\hat{I}_{or\_min}\Big|_{unloaded} = \hat{I}_{or}\Big|_{AT} + 4\text{dB} = -111\text{dBm}.$$

The equivalent SAM power would be

$$\hat{I}_{or} = -111\text{dBm} + 4\text{dB} - 5\text{dB} = -112\text{dBm}/50\text{kHz}$$

where the 4dB term accounts for the different noise figure assumptions, as before, and the 5dB term accounts for the 150kHz to 50kHz conversion. From the table above, we can see that the corresponding data point is (–112dBm, 13.8kbps) per 50kHz, so in SAM 150kHz, we could expect to have 3*13.8kbps = 41.4kbps. In this case, the EV-DO cell edge data rate of 76.8kbps is about 86% higher.

This analysis shows that EV-DO not only delivers data at faster rates than SAM, but EV-DO's coverage is better than SAM's.

B. Broadband Has Superior Capacity Than Wideband

In addition to having superior data rates and coverage over SAM, EV-DO also has vastly superior capacity assuming that they supporting equal data rates—this is an advantage of many orders of magnitude. There are no publicly available figures on the capacity of a SAM network.

However, we can compare the capacity of a EV-DO network to a network that uses the EDGE air interface. SAM uses 150 KHz carriers, while EDGE uses 200 KHz carriers, and therefore, the capacity of an EDGE network should be roughly comparable to a SAM network.

We begin with the capacity of an EV-DO-based network. In DO Release 0 (DOr0) and DOrA, the throughput is directly proportional with the number of carriers (assuming that the number of users per sector is also scaled accordingly).

Forward link capacity

Receiver Type	**Throughput (kbps / sector / 1.25MHz)**	**Spectral Efficiency (bits/Hz)**
DOr0 with no Receive Diversity	870	0.7
DOr0 with Receive Diversity	1,242	0.99
DOrA with Receive Diversity and Equalizer	1,500	1.2

Forward link simulation assumptions:

- Full buffer
- 10 users per sector
- Site-to-site distance 2km
- ITU Channel Model Probabilities:
    - pedA 3km/h 30%,
    - pedB 10km/h 30%,
    - vehA 30km/h 20%,
    - pedA 120km/h 10%,
    - Rician 10%

Reverse link capacity

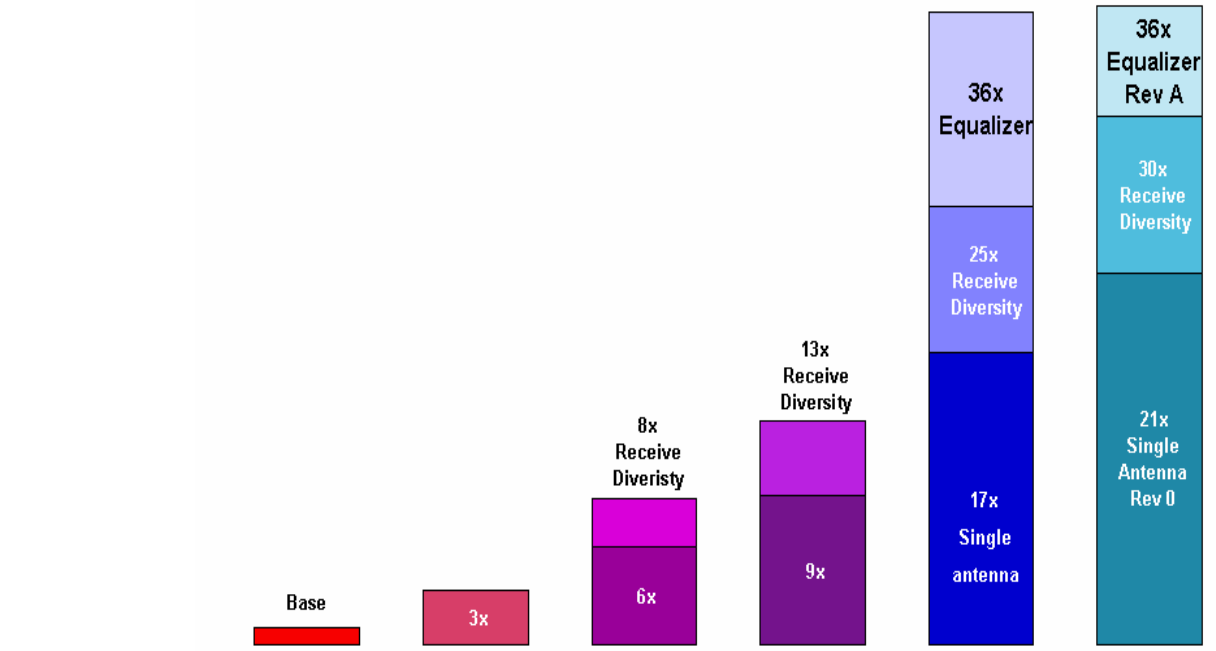
Receiver Type	Throughput (kbps / sector / 1.25MHz)	Spectral Efficiency (bits/Hz)
DOr0 with 2-way Receive Diversity	317	0.25
DOrA with 2-way Receive Diversity	541	0.43
DOrA with 2-way Receive Diversity and SIC	894	0.72
DOrA with 4-way Receive Diversity	1,304	1.04
DOrA with 4-way Receive Diversity and SIC	2,030	1.62

Reverse Link Simulation Assumptions:

- Full buffer
- 10 users per sector
- Site-to-site distance 2km
- Average RoT with non-SIC: 5.5dB
- SIC, Successive Interference Cancellation, includes Pilot and Traffic Interference Cancellation
- ITU Channel Model Probabilities:
    - pedA 3km/h 30%,
    - pedB 10km/h 30%,
    - vehA 30km/h 20%,
    - pedA 120km/h 10%,
    - Rician 10%

Now, turning to EDGE, which can be used as a proxy for SAM given their similar bandwidths, the capacity is much more limited. The following shows that DOrA has twelve times the capacity of EDGE on the forward link and an even greater advantage on the reverse link.

Forward link capacity



	GPRS[1]	EDGE[2]	WCDMA[3]	1X[4]	HSDPA[5]	1X EV-DO[6]
kbps/Sector	290	890	1,600 - 2,400	2,450 - 3,675	4,800 - 10,400	6,090 - 10,500
Spectral Efficiency	0.03	0.09	0.16 - 0.24	0.25 - 0.37	0.48 - 1.04	0.61 - 1.05
Frequency Reuse	1/3	1/3	1/1	1/1	1/1	1/1

The table above uses 10 + 10 MHz. However, using a smaller amount of spectrum will not change the relative performance of the air interfaces shown above to any significant degree.

Forward link simulation assumptions:

- EDGE
  - Full buffer
  - Site-to-site distance 2.6km
  - BTS Antenna Gain 17dBi
  - 1 Rx Antenna in mobile
- EV-DO
  - Full buffer

- 10 users per sector
- Site-to-site distance 2km
- ITU Channel Model Probabilities:
  - pedA 3km/h 30%,
  - pedB 10km/h 30%,
  - vehA 30km/h 20%,
  - pedA 120km/h 10%,
  - Rician 10%

It should be noted that while the comparison above used EDGE rather than SAM, the performance of those two air interfaces is similar. In our analysis, EDGE can deliver 890 Kbps in 10 MHz. We showed previously herein that SAM 150 KHz can deliver approximately 128 Kbps in 1.25 MHz or about 384 Kbps in 3.75 MHz. Finally, our analysis shows that when EV-DO supports equal capacity to EDGE or SAM, the loss in link budget due to reverse link ROT of DO will be much smaller than the 5.5 dB assumed for maximum capacity comparison.

Thus, if the Commission stands by its tentative conclusions, public safety agencies will be able to deploy broadband technology, which delivers data at faster rates, over a broader range, and with superior capacity than wideband.

E. If Multiple Technologies Are Deployed, It Will Be Costly & Difficult to Attain Full Interoperability

As QUALCOMM has stated in its prior filings on this subject, if public safety agencies deploy, for example, EV-DO and/or WCDMA/HSPA, either in a national network or in regional networks, there will be full interoperability, assuming the use of dual mode devices. By contrast, if various public safety agencies deploy networks based on multiple technologies, either all broadband or with some broadband and some wideband, for which devices with multi-mode chips are not available, it will be impossible to achieve full interoperability. Depending on the

technologies deployed, multi-mode chips, even if available, will significantly drive up the costs and complexity of devices and will ruin the economies of scale that public safety could otherwise leverage by deploying commercial off-the-shelf devices. Public safety should be strongly encouraged to coalesce around a single air interface to be deployed in a national network to attain full interoperability at the least possible cost.

V. Conclusion

Wherefore, QUALCOMM respectfully requests that the Commission: 1) reject proposals seeking to have the Commission restrict entry into the 700 MHz auction or mandate or forbid particular business models; and 2) endorse its tentative conclusion reconfiguring the 700 MHz public safety band so that it has two 5 MHz blocks for broadband services with two 1 MHz blocks of guardband protecting the adjacent narrowband spectrum from interference.

Respectfully submitted,

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