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

In the Matter of	)	
	)	
The 4.9 GHz Band Transferred from	)	WB Docket No. 00-32
Federal Government Use	)	

THE 4.9 GHz OPEN STANDARDS COALITION
EX PARTE FILING

I. Introduction and Summary

As a result of meetings held August 4 and 5, 2004 with Commission staff, the National Public Safety Telecommunications Council (NPSTC), and members of the 4.9 GHz Open Standards Coalition (Cisco Systems, Inc., Nortel Networks, Inc., Tropos Networks, Inc., PacketHop, Inc. and Bermai, Inc.), were asked to provide additional information in support of their mutual views that the Commission should change its rule to permit the use of DSRC Mask A for transmitting devices using the public safety licensed spectrum, 4940-4990 MHz at or below 20 dBm.[1] In response to staff requests, NPSTC has separately filed a detailed technical analysis of a typical communication scenario, illustrating the effects of using DSRC Mask A compared to using DSRC Mask C in a simulated event involving a major explosion in a downtown area. The instant submission, from the 4.9 GHz Open Standards Coalition, summarizes the findings of the NPSTC analysis and responds to various questions staff members raised with respect to the emissions mask selection issue.

On reconsideration, the Commission is considering whether to adopt a slightly wider emissions mask, DSRC Mask A, or a slightly narrower mask, DSRC Mask C, which is similar to the FCC mask adopted in the Report and Order. Staff has stated that one key criterion is the extent to which each emission mask contributes to reducing adjacent

[1] A preponderance of the commercial 802.11 equipment manufactured for use today operates at or below 20 dBm. Our proposal therefore embraces standard, commercial power levels. It does not constitute any type of "power limitation" as Motorola has incorrectly suggested. Motorola Ex Parte, WB Docket No. 00-32, August 19, 2004 at 4. We would also note that Motorola's most recent suggestion of using Mask A up to 8 dBm for a 20 MHz channel would result in equipment having an operating range of a few feet, a range that is worthless to public safety applications. Id. at 5. The 4.9 GHz Open Standards Coalition also previously suggested that, since real-world experience is lacking for both Mask A and Mask C at higher than 20 dBm, the FCC's rules should permit experimental licenses to be used for both masks to allow the public safety community and industry to gain real-world experience with higher power levels.

channel interference. Selection of the mask is irrelevant to co-channel uses of the same frequency, since any interfering effects of co-channel interference are common to both Masks A and C. The arguments put forward by Motorola in its filing dated August 19, 2004 are off the topic and have no merit. Mask selection only affects adjacent channel interference.

Since mask selection only affects adjacent channel interference, and, significantly, because the transmissions in this band are packet data, the term "interference" in this context will not cause the complete loss of communications as it does in the analog or digital voice context, but simply a drop off in packet data transmission rates that in the vast majority of cases will be imperceptible to the public safety user. For example, assuming a 20 MHz wide channel as in a 802.11 system, data rates begin at 54 Mbps, and would fall to 6 Mbps, an amount that is many multiples over the data rates public safety uses today, ***even for its most bandwidth-intensive uses***, and would likely use in the foreseeable future.[2]

From the record now before you, it is evident that both NPSTC, in its filings, and the 4.9 GHz Open Standards Coalition strongly agree that the standard 802.11 Mask A, also known as DSRC Mask A, presents a negligible difference in interference relative to DSRC Mask C.

With respect to adjacent channel interference, use of the slightly narrower DSRC Mask C provides virtually no advantage relative to DSRC Mask A. In the scenario studied by NPSTC, a large bomb explodes in an urban setting, requiring response from a police department, fire department, emergency medical services and a bomb squad. Each will operate on a single 10 MHz frequency, adjacent to each other. A total of 65 simultaneous devices will be operating in a defined perimeter of a little more than one city block. The example assumes that communications will consist of everything from simple data communications to high resolution video. Even in a completely unmanaged communications environment, the following findings obtain: (1) Mask A allows nearly the same data rate as Mask C; (2) use of Mask A permits all users to simultaneously communicate on the applications of their choosing with no degradation of service; (3) there is no "denial of service" as data rates have been shown to be practically unaffected. The following table will be discussed in more detail below and is included here to underscore the negligible performance differences between Mask A and Mask C.

Mask A data rate is virtually the same as Mask C

Responder	**Mask A data rates**	**Mask C data rate**	**Percentage difference**
Police	12.75 Mbps	13.25 Mbps	**3.9%**
Fire	12.96 Mbps	14.30 Mbps	**10.3%**
EMS	14.53 Mbps	15.77 Mbps	**8.5%**
Bomb squad	16.25 Mbps	16.26. Mbps	**0.1%**

[2] For example, high resolution video transmits at packet data rates of no more than 500 kbps (kilobits per second).

Moreover, the NPSTC study reveals that only 4% to 28% of each channel's capacity is required in order to support all user applications. Even in a completely unmanaged scenario, 802.11 technology equipped with Mask A provides ample capacity, at high speeds, to deliver all the applications that these multiple simultaneous users will use to address the incident.

As the FCC evaluates the positions of the parties on the emissions mask issue, the relevant test to apply is whether the final rule will promote effective public safety communications and innovation in wireless broadband services in support of public safety.[3] The Commission's analysis should be informed by the unanimous opinion of the public safety community that it strongly prefers a solution that will allow it to leverage the highly competitive and innovative 802.11 wireless broadband market, which uses Mask A, for products that meet its data communication needs. In evaluating emissions masks, the FCC should determine whether the masks will permit "effective public safety communications," considering the engineering characteristics of the masks, how those masks will operate to affect data rates in daily public safety operations, as well as in severe unmanaged incidents involving multiple agencies responding to a large-scale incident scene (as in the aforementioned scenario used in the NPSTC analysis). In addition, the Commission should consider how its selection of masks will impact innovation, looking at the potential development of the equipment market for 4.9 GHz public safety solutions, including Access Points and client equipment such as laptops and PDAs. It is significant that rules allowing the use of Mask A would not preclude any suppliers if they so choose from offering equipment that uses a narrower mask such as Mask C, but mandating a mask narrower than Mask A will inhibit the current suppliers in the wireless local area network industry. Finally, the Commission should give serious consideration as to whether the proposed rule will be technology neutral. In summary, the 4.9 GHz Open Standards Coalition is confident that the Commission must conclude that changing its rule to accommodate DSRC Mask A is the best in promoting effective public safety communications and innovation in wireless broadband services in support of public safety.

This paper discusses the following topics: (1) performance in a "severe unmanaged incident " scenario analyzed by NPSTC involving uncoordinated spectrum use by four public safety departments at a major incident scene, comparing the performance of Mask A with Mask C and showing negligible operational differences in data rate delivery and performance of applications; (2) a discussion of costs associated with implementing a non-standard "C" mask on 802.11 technology and the likely impact that selection will have on the market for products to address public safety's needs; (3) examples of how the 802.11 market has recently innovated, and new innovations that are in progress in the standards bodies; and (4) the benefits of technology neutral rules.

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[3] The 4.9 GHz Band Transferred from Federal Use, WB Docket No. 00-32, Report and Order at ¶ 2.

We conclude: (1) there is negligible difference in performance of Mask A compared to Mask C in a severe unmanaged incident scenario, and Mask A easily supports (with much room to spare) the applications that public safety will use; (2) total costs to manufacturers of implementing Mask C are sufficiently high to discourage the vast majority of 802.11 manufacturers from providing equipment specific only to the U.S. public safety market; (3) use of Mask A will allow public safety to reap the greatest benefits from innovation; (4) Mask A is the most technology neutral rule and does not preclude a public safety entity from implementing a product with Mask C if it so chooses.

The following chart summarizes the conclusions of this ex parte:

Item	**Mask A**	**Mask C**
1. Effective performance in severe unmanaged incident scenario		
• Near-far issues	Commercial off the shelf technology elegantly handles adjacent channel issues	No commercial deployment to compare
• Severe unmanaged incident performance	Negligible difference with respect to Mask C	Negligible difference with respect to Mask A
• Available bandwidth and interoperability	455 MHz available in 5 GHz band that can be accessed if utilizing Mask A	None. Restricted to 50 MHz in 4.9 GHz band with no opportunity to utilize other frequencies due to incompatible mask.
• Incident management	Required	Required
2. Cost	Large competitive supply will drive competitive pricing	Limited supply will cause higher pricing
3. Promotes innovation	Large industry driving innovation	Few manufacturers will choose to offer Mask C, resulting in less innovation
4. Technology neutral	Mask A rule allows use of Mask C and is most technology neutral	Mask C rule does not allow use of Mask A

1. Effective performance in unmanaged, "severe unmanaged incident" scenario

Commission staff has asked parties promoting use of Mask A to imagine a "severe unmanaged incident" scenario that would present a case of adjacent channel interference. In this section, we discuss such an example, provided by NPSTC, in order to better understand the emission mask debate.

The Report and Order determined that use of an emissions mask will "improve the reliability and performance of distinct services such as WLAN, and PAN/VAN operating at different power levels in adjacent channels."[4] The text of the Report and Order does not name or discuss the merits of any particular emissions mask, although the rules adopt what is commonly referred to as "the FCC mask" which is similar to, but not identical to, DSRC Mask C. In addition, the text does not name or discuss the deficiencies of any particular mask. Since the commencement of this proceeding, and even subsequent to the Report and Order, public safety's use of 802.11 technologies has expanded substantially. There is now tangible experience in operational activities that demonstrates its capability to serve this critical sector and be a source of innovation and expanded services.

An emissions mask rule is helpful for the 4.9 GHz public safety band. However, the 4.9 GHz Open Standards Coalition, and NPSTC, each disagrees with the particular mask selected by the FCC. The relevant test is whether the mask will promote effective data communications and innovation for public safety while ensuring the integrity of the transmission. Only Mask A meets those requirements. Therefore, on reconsideration, the Commission should amend its rule to allow Mask A to be used. In the following discussion, we address the effectiveness of Mask A, and compare it with the other potential mask under consideration, Mask C.

In a companion filing, NPSTC provides an analysis addressing a complex scenario where one might expect extensive data communications. For purposes of the analysis, ***NPSTC assumes uncoordinated use of the spectrum by different public safety agencies with no protocol in place***. The 4.9 GHz Open Standards Coalition and NPSTC strongly disagree that incident scenes will be unmanaged. In our view, the very character of this spectrum will require coordination, and we discuss our reasons for that below. However, an extreme "severe unmanaged incident" scenario will illuminate the negligible performance differences between Mask A and Mask C. The completely unmanaged scenario NPSTC provides assumes that each public safety agency arrives at the scene and selects a different10 MHz channel out of the available four, some of which are adjacent to each other, and that no incident commander takes charge of communications at the scene. These assumptions are necessary in order to illustrate the adjacent channel

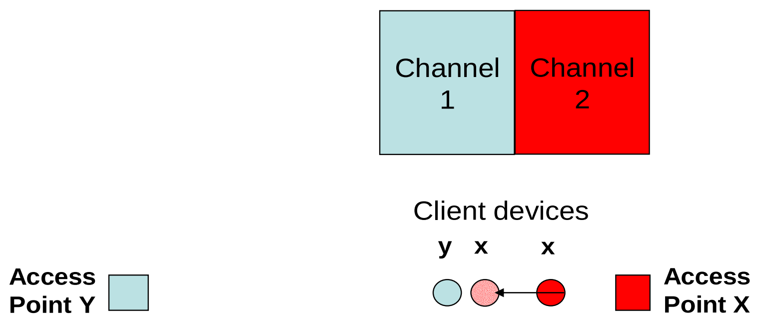
[4] Report and Order at ¶54.

"interference" effects that are at the heart of the staff's questions.[5] We summarize the NPSTC scenario here in narrative form.

Before delving into the example (subsections A-C below), we offer an important piece of background on how 802.11 technology functions in situations commonly referred to as "Near-Far Effects."

Understanding how 802.11 technology copes with packet collisions as adjacent channel interference is important. In the following example, a client device ("x") served by a nearby mobile Access Point ("APX") is operating on an adjacent channel to a client device ("y") served by a mobile Access Point ("APY") located somewhat further away geographically. Client device "x" then approaches client device "y." The following chart illustrates the example.

Adjacent Channel Transmission: Simple Example of Near-Far Effects



As client device "x," transmitting on channel 2, approaches client device "y," receiving on adjacent channel 1, "y" experiences adjacent channel undesired energy (from "x") that eventually dominates the reception of the co-channel desired energy from Access Point Y ("APY ") due to "near far" issues. 802.11 technology elegantly responds to the adjacent channel interference problem in two ways: (1) using threshold detection, "APY" reschedules its packet transmissions; or (2) the transmission "APY-y" will migrate to time-share channel 2, enabling an even stronger set of interference protections.

In our example, "y" will detect RF energy from "x" and may interpret it as an ongoing transmission to the extent the detected energy is higher than a specified threshold. Once energy levels are higher than the threshold, the "APY-y" link will reschedule packet transmissions to a time when "APX-x" energy is not detected, thereby avoiding collisions. Thus, even though "y" and "x" belong to different access points, the

[5] For co-channel "interference" the mask makes no difference. In the case of 802.11 technology, 802.11 devices are equipped with automatic clear channel select and "listen-before-talk" to avoid co-channel simultaneous transmission.

collision avoidance, based purely on detected RF level, successfully allows transmissions to complete. If, however, transmission “y” migrates to the other channel (through RF scanning and if allowed by security administration), then a stronger collision avoidance can also be invoked (called “virtual mechanism” in 802.11). In this case, they can receive and interpret data frames at the medium access layer as they both are associated with the same access point which allows them to participate in coordinated transmission mechanisms (such as Request-to-Send and Clear-to-Send, RTS-CTS) as well. This simple example of near-far effects helps explain why commercial off-the-shelf 802.11 technology using Mask A performs so well in the example below.

A. NPSTC “severe unmanaged incident” scenario

NPSTC, in its filing, assumes a severe unmanaged incident scenario involving a major explosion in a city block that requires four public safety entities to deploy vehicles and personnel – fire, police, emergency services, and special operations (*e.g*., bomb squad). Each is served by a mobile command center.

NPSTC assumes each will occupy one of the four available 10 MHz channels.[6] It is assumed in this example that no incident scene commander specifies channel usage, or movement of command center vehicles to separate those vehicles geographically – all will be parked next to each other at the scene. The example also assumes asynchronous or uncoordinated simultaneous transmissions, which for the purposes of this analysis is a highly conservative assumption (*i.e*., it increases the communications challenge).

NPSTC’s incident scenario involves a large explosion, multiple victims who are both injured and who die at the scene, and the discovery of a subsequent suspect explosive device that requires the use of a remote-controlled robot to disable it. NPSTC assumes the following units respond, and utilize the following data communications capabilities.

[6] At this time, the channel plans have not been established for the 50 MHz allotted to public safety at 4.9 GHz. Should public safety choose 10 MHz-wide channels, the industry anticipates no difficulty in meeting their needs, since products are already being developed to meet the 802.11j standard using 10 MHz-wide channels. In addition, we expect that public safety agencies can take advantage of other spectrum choices, and possibly other technologies for backhaul of data, so that it will not necessarily be true that 4.9 GHz will be used for backhaul. NPSTC’s scenario is simply based on the staff’s interest in seeing a “severe unmanaged incident” scenario where the band is fully loaded.

Responder	No. of units	Communication requirements
Police	35	• From AP/Incident Command to Units o PDA-based applications that include text messaging and the display of on-scene maps that show the geo-location of all other police units. • From Perimeter Units to AP/Incident Command o Photographs of crowds and individuals in the vicinity of the perimeter. These are sent to Federal Government databases via the mobile command unit's back haul links for image recognition analyses against those known to be associated with terrorist activities. o Geo-location Information
Fire	13	• From AP/Incident Command to Units o Head up display-based applications that include text messaging, the display of on-scene maps that show the geo-location of all other fire units, and periodically updated IR imagery of affected buildings showing possible ignition/combustion activities. • From Perimeter Units to AP/Incident Command o Tactical images and video on demand. o Geo-location Information o Unit "health" status that included vital signs, oxygen supplies, and ambient temperature.
EMS	12	• From AP/Incident Command to Units o Head up display-based applications that include text messaging, and vital signs. • From Perimeter Units to AP/Incident Command o Telemedicine images and video on demand. o Patient and triage "health" status that includes vital signs, medicinal and blood supplies.
Special Operations (bomb squad)	1	• From AP/Incident Command to Robot Unit o Control information.

		• From Perimeter Units to AP/Incident Command o Video Information for robot control

In order to show adjacent channel interference effects, the NPSTC model assumes that the WLAN system is ***fully loaded*** with simultaneous adjacent channel transmissions – at 60% channel transmit duty cycle (60% is the effective maximum throughput level for a CSMA system) instead of the normal 10%. Again, the example assumes NO communications coordination by the incident commander. The systems simply function per the 802.11 standard.

Assuming the complex, simultaneous use of four 10 MHz channels by multiple agencies, with severe demands placed on the system, and no communications coordination, the following average "at-receiver" data rates were obtained on each of the channels, averaging all the data rates achieved by users of that channel over the incident duration:

Mask A data rate is virtually the same as Mask C

Responder	**Mask A data rates**	**Mask C data rate**	**Percentage difference**
Police	12.75 Mbps	13.25 Mbps	**3.9%**
Fire	12.96 Mbps	14.30 Mbps	**10.3%**
EMS	14.53 Mbps	15.77 Mbps	**8.5%**
Bomb squad	16.25 Mbps	16.26. Mbps	**0.1%**

Moreover, not only is the data rate virtually the same, but Mask A more than adequately handles the multiple, simultaneous applications from all users in this concentrated geographic area. Table 3 of the NPSTC study reveals that 4% to 28% of each channel's capacity is required in order to support all user applications as shown below.

Table 1: Simulation Results – Delivered Payload (Mask A) vs. Requirements

	User Application PHY Throughput Requirements (MB/Hr/Unit)			Minimum Provided by Mask A Technology (MB/Hr/Unit)		% of Channel Capacity Utliized by User Applications
Service	**Inbound**	**Outbound**	**Service**	**Inbound**	**Outbound**	
Police	1.0	6.5	**Police**	18.5	8.2	**28%**
Fire	5.0	51.0	**Fire**	206.7	85.3	**19%**
EMS	5.0	55.0	**EMS**	286.0	220.6	**12%**
Bomb Squad Robot	50.0	225.0	**Bomb Squad Robot**	666.7	6,646.7	**4%**

Further information on data rates for each individual unit is available in the August 20, 2004 NPSTC ex parte filing.

Emissions Mask A gracefully supports even a heavily loaded "severe unmanaged incident" incident scene with no incident scene command, and thus no

"denial of service" occurs.[7] ***Therefore, there is negligible difference in the effectiveness of emissions Mask A compared to emissions Mask C.*** [8]

B. Available bandwidth and interoperability

We would also note that selection of Mask A also means that unlicensed spectrum at 5 GHz will be immediately available to public safety in the event of a truly catastrophic event such as the World Trade Center attacks of 9/11. Virtually every manufacturer interested in serving public safety has indicated interest in providing transmitters that will provide service from 4.9 GHz to 5.9 GHz. An additional 455 MHz of spectrum is available in 5 GHz that public safety can use as a reservoir to draw on for additional spectrum needs. As public safety establishes a perimeter and evacuates a catastrophic scene, these frequencies – even if in routine use – will become available. This benefit is missing if Mask C is selected. ***Only use of Mask A provides a substantial reservoir of spectrum at 5 GHz***. Not only do WLAN manufacturers plan to use Mask A for 5 GHz equipment, but ubiquitously available wireless laptops and PDAs are at present available only with Mask A. Further, with the advent of radios that perform channel selection, interoperable use can become automated and more efficient. In such integrated devices, the availability of 4.9 GHz can be restricted only for use by public safety, while allowing public safety access to the unlicensed bands when necessary.

Ability to use such a reservoir of spectrum in 5 GHz band (both UNII and DSRC) ***dramatically improves interoperability between public safety agencies***. Considering the

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[7] In its August 19, 2004 ex parte filing, Motorola makes several "denial of service" arguments that serve only to deny clarity of the debate. Motorola Ex Parte, WB Docket No. 00-32, August 19, 2004 at pages 13-16. First, Motorola argues that denial of service will occur due to "near-far" effects. As we explain in this paper, at page 7, the argument is false. This is further confirmed by NPSTC's simulation, where no denial of service occurred. Second, Motorola makes an argument that denial of service will occur for co-channel, "hidden nodes." But the selection of the mask is completely irrelevant to co-channel interference. In addition, there are multiple mechanisms in the 802.11 standard that are specifically designed to avoid co-channel interference, such as channel sensing mechanisms to adaptively control access and avoid collisions (CSMA/CA), and Request-to-Send (RTS) and Clear-to-Send (CTS) that are specifically designed to combat hidden-node problems. Third, Motorola erroneously alleges denial of service due to the way the TCP/IP protocol manages packet loss. If any packet is lost, TCP will try to recover those packets at a higher layer through retransmission and is common to both the masks. Motorola's "denial of service" arguments should be completely disregarded.

[8] We note that these results are obtained with standard antennas. While NPSTC has in other filings argued that improved receiver technology can, by itself, erase the differences in emissions masks, NPSTC's August 19, 2004 analysis of an incident makes clear that standard antenna receivers are more than adequate to handle critical public safety needs. Suggestions by Motorola that one must use improved receiver technology if using Mask A are simply incorrect. Motorola Ex Parte, August 19, 2004 at 4.

explosion of multimedia usage occurring in the commercial WLAN networks, public safety broadband multimedia applications can be expected to similarly exceed the traffic that can be supported by the limited spectrum available in the 4.9 GHz band (for example, a major incident may involve traffic from tens or even hundreds of video cameras). In such situations, it will be very desirable for public safety to be able to divert non mission-critical video traffic to the unlicensed bands either by pre-design or automatically. Such an interoperable use of the spectrum will be feasible only when radios use a common standards-based Mask A. Further, in daily use cases, the public safety community can use any installed infrastructure in the unlicensed band where 4.9 GHz facilities are not available.

C. Incident management

The 4.9 GHz Open Standards Coalition believes that the Commission can base its judgments in this reconsideration on the predicate that incident scenes are managed from a communications perspective; that protocols will be in place and adhered to. We believe that one fundamental premise underlying sound spectrum policy is that on scene operations will be based on a reasoned comprehension of the challenges faced in a range of RF environments. The September 11, 2001 attacks and the heightened national security awareness make this imperative. The public safety community frequently advocated its commitment to management because of the undisputed benefits it can bring. Spectrum policy should not be based on the contrary. For example, when the Department of Homeland Security presented a list of operational "scenarios" that are the basis of future requirements for public safety communications, its scenarios involved incident management.[9]

In summary, we believe that the unmanaged "severe unmanaged incident" scenario presented above is unlikely, and that any negligible differences in performances of the two masks under consideration can be administratively managed. Moreover, if the Commission selects Mask C, on-scene incident management will still be required.

2. Cost issues and impacts to competitive supply

In the record, there are statements that the costs of deploying Mask C are not significantly above Mask A. According to Motorola, the "incremental materials cost" of providing Mask C is 10%.[10] Motorola suggests two principal ways to alter commercial

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[9] *See* Project Safecom, Statement of Requirements for Public Safety Wireless Communications and Interoperability, Department of Homeland Security, March 10, 2004 Operational Scenario 5, Terrorist bomb explosion at p. 129.

[10] Motorola Petition for Reconsideration, WB OO-32, at Appendix A.

off-the-shelf Mask A chipsets: (1) addition of filters; (2) altering the chip itself. But these assertions fail to capture the true cost and operational barriers that exist to the development of devices using Mask C technology. When those costs are fully considered, it is apparent that the bulk of the 802.11 vendor community will avoid development of 4.9 GHz products, given the relatively small size of the U.S. public safety market to the overall market for 802.11 equipment which utilizes the standards-based Mask A. We believe competitive sources of supply will be severely constrained.

- Add an external filter to existing chips.[11] Motorola makes a completely unsupported allegation that material costs for an external filter will add $3.00 per device.[12] Even assuming, for the sake of argument, that the $3.00 figure is grounded in a reasoned analysis of materials cost, Motorola's cost assertions complete ignore significant nonrecurring costs – *e.g.*, cost of redesign of equipment, testing, certification, retooling assembly process, inventory management – costs that could run into the millions per manufacturer. In the Coalition's view, the true cost of adding external filters to access points and client devices would significantly add to the price of access points and client devices. Moreover, client devices are optimized for power consumption. Because Mask A is used by the current 802.11 standard, the effect of this mask on battery life is well understood. There is no information in the record to provide comfort that Mask C will not significantly affect battery life.

- Create a new silicon chip. Motorola says an unnamed four of seven manufacturers say they can support Mask C with existing chipsets plus software changes and external filters.[13] The companies filing this presentation have asked chip manufacturers about this possibility for a new chip design and its cost. At this time, we have no information from chip manufacturers on whether existing chips can support the tighter mask with software changes and external filters or their estimated costs for these changes and filters. Additionally, no information is provided by Motorola or is available from chip manufacturers about how these changes and filters would affect transmit power levels, especially for client devices. If transmit power level has to be decreased to the point where it results in very limited range for client devices, existing 802.11 chipsets would be nearly worthless in a public safety application We urge the Commission to consider the potential gap between the "possible" and the "practicable," and request that no weight is given to Motorola's unsubstantiated assertion that existing chipsets can support the tighter mask.

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[11] Motorola Ex Parte, WB Docket No. 00-32, December 17, 2003 (presented December 16, 2003) at page 16.

[12] Motorola Ex Parte , WB Docket No. 00-32, August 19, 2004 at 4.

[13] Motorola Ex Parte, WB Docket No. 00-32, December 17, 2003 (presented December 16, 2003) at page 16.

In summary, the Coalition's member companies believe that the full cost of implementing Mask C for devices at the 4.9 GHz public safety band will be substantial. With respect to the addition of filters, the costs are orders of magnitude greater than what Motorola states. Further, based on the information that Motorola provided in its filings and the information that Coalition members have been able to gather from their chip vendors, it is questionable whether even the addition of external filters will allow existing chipsets to meet Mask C at meaningful transmit power levels.

Moreover, the production of specialized or modified devices for a narrow segment of the U.S. market (*e.g*., public safety) will discourage many, if not most, equipment vendors from offering equipment to public safety. Equipment makers are highly unlikely to divert manufacturing resources to addressing a specialized public safety market at 4.9 GHz in the U.S., given that costs will be high to do so, the addressable market for commercial off-the-shelf technology (*e.g.,* 2.4 and 5 GHz) is large and growing worldwide, and the opportunities in a niche market such as 4.9 GHz would be limited. ***The selection of Mask C will restrict competitive supply.***

3. Innovation test favors Mask A

As stated above, the objective the Commission has established for itself in creating rules for 4.9 GHz is to craft rules that will promote both effective public safety communications and rules that will foster innovation in this band. Simply put, 802.11 is an open, standards-based technology that is the locus of an almost unimaginable level of innovation. The foundation of current commercial WLAN devices and applications are based on 802.11 technologies developed by the IEEE and the Internet Engineering Task Force (IETF) that are continuously being augmented and improved. For example, 802.11 extensions include 802.11e (Quality of Service), 802.11i (security mechanisms), 802.11n (high throughput), 802.11r (fast roaming) and 802.11s (meshed access points). Each of these is at various stages of standardization and will add significantly improved capabilities to 802.11. Such new additions to the standards are being translated into commercial markets at a rapid pace. In fact, some of them are already being introduced on a trial basis even as the standards are being finalized. The public safety community can leverage these advancements rapidly, but only if their equipment is based on Mask A.

In contrast, Mask C is not even in production or commercial use. If it is specified by the Commission in the 4.9 GHz public safety band, only those few manufacturers interested in offering equipment for U.S. public safety would develop Mask C. It would have to be added to client devices – no client devices today use it. Only a few suppliers consider the public safety market of a sufficient size to make these kinds of specialized products.

Not only is Mask A operationally proven, but it is supported by one of the most dynamically growing markets for communications equipment today. During the past two years, 802.11 technologies have penetrated global markets at phenomenal speed. Successful operation of the 802.11 devices also has led to commercial, carrier-style services being offered for mobile users across multiple geographic regions. According to published surveys, commercial WLAN chip set shipments are expected to reach about 60 million and forecasts for 2007 are anticipated to be around 150 million, which is a clear testament to the success of the 802.11 technology.

Mask A allows public safety to participate in 802.11 technology and is the only option that assures that public safety will enjoy the current and future benefits of innovation.

4. Mask A is the most technology neutral solution

The Commission's commitment is to try, wherever possible, to make decisions that are technology neutral. As stated by FCC Chairman Michael Powell, "The FCC does not want to be the arbiter of what does or does not work. Instead, we should strive to facilitate innovation, and make sure that we do not get in the way."[14] Wireless policy should maximize opportunity for innovative technologies.

> "Wireless is vital to our goal. The best way to achieve the benefits that we're talking about is to not rest on any single technology. I will give anybody who has the possibility, the opportunity and the entrepreneurial spirit to develop a broadband platform, the chance to bring it to market and deploy it to consumers. This is not an agenda just for a phone company, just for a cable company, just for a big wireless company. It is also a forum for entrepreneurs, innovators, and radical creators of new goods and services and it's the Commission's mission to try to drive any platform that can deliver these services and deliver them effectively."[15]

In the present case, Mask A is the most technology-neutral solution. A rule authorizing the use of Mask A for the public safety band at 4.9 GHz would also permit the use of a narrow "C" mask. But if Mask C is selected, 802.11 vendors are not going to be able to take advantage of standards-based technology that utilizes Mask A and market that equipment into the 4.9 GHz public safety market.

[14] Chairman Michael Powell, Remarks before Broadband Access Network Coordination (BANC) Event, San Francisco, California July 12, 2004.

[15] Chairman Michael Powell, Remarks before the Broadband Access Task Force Forum, May 19, 2004.

II. Conclusion

The issue before the Commission is whether the 4.9 GHz band can be a source of innovative technology and services for public safety agencies. To restrict the band to Mask C will isolate the public safety market from the considerable advances that pervade 802.11 technologies and artificially confine those who serve it. The purported interference protections of Mask C do not withstand scrutiny of a detailed technical analysis and become unworkable when balanced against the broad benefits that accompany Mask A. Mask A best promotes effective public safety communications and innovation in wireless broadband services in support of public safety.

Respectfully submitted,

THE 4.9 GHz OPEN STANDARDS COALITION

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