

Public comments on 4.9GHz NPSTC recommendations

4.9GHz National plan recommendations Final report dated Oct 24, 2013

Re: WP docket 07-100, PS docket 06-229 and WT docket 06-150

General remarks: The group (NPSTC) has provided certain recommendations to the FCC 4.9GHz broadband spectrum based on their experience. Their experience in 1G or “Analog” technology and current deployments of 2G (TDMA) in public safety systems in the form of P-25 are used as the basis of their recommendations. In general, TDMA technology was implemented by the cellular industry in 1990 and over the past two decades these networks have retired / replaced. NPSTC and the public safety community must investigate broadband technology in order to understand the growth of 3G or 4G technologies of cellular systems (mobile) and in parallel the development of broadband networks for fixed (not mobile) communication. Both cellular (mobile) and WiFi (fixed) are in widespread use today. A limited number of users in the NPSTC have experience in broadband communication using 802.11 based access points in the 4.9GHz band.

It is not clear if this small group (mostly based in north east and west coast parts of the country) is recommending that 4.9GHz band be turned into a narrow band system. Most of NPSTC members are familiar with narrow band systems of 25kHz bandwidth that are completely dedicated to voice communication. A secondary application for 4.9GHz is microwave links that the group understands. NPSTC description about interference is contrary to wider public perception of these upper GHz technologies. Although created by FCC originally as a “secondary use”, considerable attention of this group is focused on point to point microwave. However it is important to note that a large number of microwave links do exist in the 5.8GHz band used by both cellular carriers and others. At the same time 5.8GHz band has also found widespread use in WiFi systems. The basis of interference and therefore recommendation to provide separate bands for different uses is contrary to widespread worldwide perception.

Before analyzing reasons for separate allocations within the limited 50MHz bandwidth (of 4.9GHz band) it is fair to observe how other bands in the same part of the spectrum operate. Consider the 2.4GHz band (83MHz bandwidth) or 5.8GHz (125 MHz bandwidth in band c) operate on TDD and not FDD. In any major city today (NY, Chicago, LA etc) if anyone uses a WiFi scanner to observe, it is normal to find well over 500 access points in operation in this band within a half mile diameter. Assuming a conservative limit of just 10 users per access point, at least 5000 users do use the system, without interference. How is this accomplished today? These numbers are a testimony to the robust design of IEEE 802.11 based standards. Given that 4.9GHz is exclusive to public safety and the number of users in the worst case of emergency is likely to be less than 500 users, what exactly concerns the NPSTC committee? All 4.9GHz systems also use 802.11 based access points, therefore what exactly is different about 4.9GHz?

In terms of backhaul 5.8GHz is used both for local WiFi coverage by access points using 802.11n, as well as for microwave links. How come these two systems do not have a problem and have worked well over the years? It is widely known that any laptop / smart phone or tablet user today has access to these two bands (2.4GHz and 5.8GHz) and have operated well since 1999 when IEEE 802.11 standard was released. The 5.8GHz link has power limits (EIRP) tighter than 4.9GHz and also 4.9GHz provides lower propagation loss as well. Why is there such a concern about separation of bands for different applications – something that has not

been done in any other IEEE 802.11 based user base till now? In fact the cellular industry has introduced SON (Self Optimization Network) since 3GPP release 10 onwards (3GPP specification TS 32.500) – this allows networks to automatically adjust themselves if interference occurs. Therefore the general trend in industry is the exact opposite of what NPSTC recommends. This applies to both licensed (cellular) and unlicensed technologies enjoyed by millions of users.

Finally, a note about manufacturers and how 4.9GHz is perceived by them. Only a handful of vendors offer 4.9GHz Access Points today because the market is so small. It is usually implemented as part of their 5GHz radio that is also programmable to 4.9GHz band. None of the vendors offer an exclusive 4.9GHz unit. Also wider range of client cards / units normally available for 2.4 GHz are not available for 4.9GHz. The only vendor (Ubiquiti) who makes 4.9GHz client cards based on an old 802.11a standard seems not too keen on offering newer technologies or wider variety of cards given the limited interest in 4.9GHz band. Also, NONE of the vendors offer 1MHz or even 5 MHz bands on their AP units. Just because NPSTC recommends these separations, it does not mean that any vendor plans to implement it. Therefore, it is likely that NPSTC will find no one to build units that conform to their concept of separating bands since they represent a very small fraction of the market base.

Given the 12 MHz allocation for public safety in 700 MHz band, it is likely that NPSTC will again provide similar recommendations (smaller bandwidths) and insure that neither 3G CDMA (1.25MHz minimum bandwidth, but often higher bandwidth needed for spread spectrum) nor 4G LTE (needs a minimum of 2.5 MHz and specifies channels all way the up to 20MHz channels) can be implemented. NPSTC vision of communication networks could terminate with 2G technology of 20th century which they may feel comfortable with.

Therefore, it may be best for FCC to do the following:

1. Recommend that NPSTC committee members get trained on IEEE 802.11 standards and get an introductory overview of how broadband communication systems operate. Understand what is MIMO, why is it so popular? Why was it considered a seminal research from Bell labs in 1998 and why it was implemented in 2000 into 3G standards? Why has MIMO become an integral part of both broadband 802.11n as well as the 4G LTE standard today?
2. IEEE communication society offers excellent on line courses helpful to the user community. This can be taken anytime and in any place that has Internet access. Since it is vendor agnostic and offered by a non profit body most public safety engineers would feel reassured. Depending on individual needs NPSTC committee members could encourage other members / colleagues to get this training and then revisit / rethink their recommendations. Wireless industry in general also looks to the WCET certification (the only worldwide certification of wireless engineers) offered by IEEE. Members of NPSTC committee could encourage their group to try and obtain this certification. Unlike certificate / tests for technicians offered by many WiFi vendors, the WCET requires a University degree with three years of experience in wireless as the minimum requirement to apply for the test. It also covers all wireless technologies such as satellite, cellular, land mobile and WiFi technologies. Note that this is only a suggestion and no one is advocating that they do this.
3. Access Point / broadband wireless vendors could offer a first hand overview of products currently available in the Wireless LAN market. They should enlighten NPSTC members as to

why all of the manufacturers (including chipset makers) vote for wider bandwidths and are moving in the direction completely opposite of what is proposed by NPSTC (cutting down spectrum into smaller chunks).

4. FCC should accept the NPSTC recommendation about database and make it mandatory for all public safety users to register. Unregistered users should be forced to shut their system down – to be enforced by FCC using its licensing authority.

A concerned citizen