

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

In the Matter of)
)
The Development of Operational, Technical, and)
Spectrum Requirements for Meeting Federal, State) WT Docket No. 96-86
and Local Public Safety Agency Communications)
Requirements Through the Year 2010)

To: The Commission

**RESPONSE OF APCO
TO PETITIONS FOR RECONSIDERATION**

The Association of Public-Safety Communications Officials-International, Inc. (“APCO”), hereby submits the following response to various petitions for reconsideration of the Commission’s *First Report and Order* in the above-captioned proceeding, FCC 98-191 (released September 29, 1998), 63 Fed. Reg. 58645 (November 2, 1998) (hereinafter “*Report and Order*”).¹

I. THERE IS STRONG FEDERAL, STATE AND LOCAL PUBLIC SAFETY SUPPORT FOR THE TIA/PROJECT 25 PHASE I (12.5 kHz) DIGITAL INTEROPERABILITY STANDARD.

APCO’s Petition for Reconsideration opposed the Commission’s decision to defer action on a digital interoperability standard for the 700 MHz band and its requirement that the National Coordinating Committee (NCC) become an ANSI-certified body to select such a standard. APCO urged instead that the Commission accept the existing

¹ Public Notice of the Petitions for Reconsideration was published in the *Federal Register* on January 21, 1999.

TIA/Project 25 Phase I (12.5 kHz) Common Air Interface and Vocoder standards (sometimes referred to as the TIA/ANSI 102 standards). Significantly, the American National Standards Institute (ANSI) and the Telecommunications Industry Association (TIA) were among the many petitioners who also opposed the standards selection process adopted in the *Report and Order*. The State of California, the New York State Technology Enterprise Corporation, King Communications USA, Daniels Electronics, Motorola, and Union Pacific Railroad, also filed petitions specifically supporting the TIA/Project 25 Phase I standard.² Of particular note, the Federal Law Enforcement Wireless Users Group (FLEWUG) states in its Petition that its member agencies (which include NTIA, the Department of Justice and the Department of Treasury) recently voted unanimously to adopt the Project 25 Phase I standard.³

FLEWUG and others agree with APCO that the Project 25 Phase I (12.5 kHz) standard is the most appropriate digital interoperability baseline, and will maximize interoperability options and secure voice operations. The Project 25 Phase I Common Air Interface and Vocoder standards have been approved by TIA and ANSI, and equipment meeting the Project 25 standard is now available from multiple vendors for the 800 MHz band and could be available shortly for the 700 MHz band. In contrast, there is no ANSI-approved 6.25 kHz standard, and it will be many years before public safety mobile radio equipment meeting any such future 6.25 kHz standard is available. As noted below, there

² As noted in APCO's Petition, at n.6, the State of Florida, the New York State Police, and the International Association of Chiefs of Police have also expressed strong support for adoption of the Project 25 Phase I standards. The State of Arizona stated its support for Project 25 in its recent "Reply Comments" (filed Jan. 19, 1999).

³ Petition for Reconsideration and Clarification of the Federal Law Enforcement Wireless Users Group, at 20, note 63 (December 2, 1998).

are also substantial questions as to whether such equipment will ever be a viable option for public safety use.

The existing Project 25 Phase I digital standard is applicable in all public safety frequency bands, and has the distinct advantage of providing backwards compatibility from digital to analog. This functionality will permit 700 MHz Project 25 Phase I equipment to be interoperable with (a) analog equipment (whether in 700 MHz or nearby 800 MHz); and (b) Project 25 digital equipment now being installed in the 800 MHz band.⁴ Through Project 25 Phase II (which requires backwards compatibility), the Phase I 12.5 kHz standard will also be compatible with a variety of future 6.25 kHz (or equivalent) technologies. That will provide for a graceful, interoperable migration to 6.25 kHz if, and when, viable 6.25 kHz equipment becomes available and is proven to be appropriate for public safety use in the United States.⁵ Adopting a 12.5 kHz standard will also preserve interoperability with federal public safety agencies, who are unlikely to convert to 6.25 kHz technology under any circumstances.

The Commission also needs to be aware of the substantial and potentially insurmountable technical and practical problems confronting use of 6.25 kHz equipment for public safety operations. Frequency stability at 6.25 kHz will need to be much more tightly controlled, linear power amplification must be employed and repeater (*i.e.*, mobile relay) stations must be spaced closer together. All this adds up to increased system

⁴ Use of the Phase I Project 25 Vocoder standard will also facilitate cross-band “patching” with digital equipment in lower frequency bands.

⁵ As noted below, and in the FLEWUG Petition, Federal Government users have no plans to convert to 6.25 kHz.

complexity and cost. In order to achieve increased frequency stability, more expensive components and more complex circuitry will be required. This will further crowd the already very limited space in portable radio equipment. Transmitters employing linear power amplifiers are significantly less efficient, resulting in shorter battery life for a given power output when used in portable equipment. The alternative of reducing portable radio transmitter power output in order to extend battery performance will require an increased concentration of repeater stations to support portable operation throughout an area. Simulcast operations, if even possible at 6.25 kHz, will also require additional transmitter sites. That will add substantial cost, environmental/zoning problems, and logistical difficulties in designing and building new public safety communications systems.

Therefore, APCO reiterates its position that the Commission should accept the existing ANSI approved Project 25 Phase I standards for the 700 MHz interoperability channels, and not wait for the development of a 6.25 kHz standard.

II. THE COMMISSION MUST REJECT ERICSSON'S PROPOSAL TO REQUIRE ONE VOICE CHANNEL PER 6.25 kHz.

As explained the APCO Petition, the Project 25 Phase I standards meet or exceed the efficiency guidelines (9.6 kbps/12.5 kHz or 4.8 kbps/6.25 kHz) adopted by the Commission for the 700 MHz band. However, Ericsson urges in its Petition for Reconsideration that this efficiency requirement should be "supplemented" to require one voice channel per 6.25 kHz.⁶ Ericsson relies upon the fact that the Commission's "refarming" rules, 47 C.F.R. §90.203, require equipment certified for operation below 512 MHz after January 1, 2005, to provide one voice channel per 6.25 kHz. However, that

⁶ Petition for Reconsideration of Ericsson, Inc. (Dec. 2, 1998) at 8.

rule does not apply for another six (6) years, and no public safety equipment meeting that requirement is currently available. APCO, therefore, strongly opposes Ericsson's proposed "supplement" to the 700 MHz efficiency rules, which would add unnecessary delays in implementation of the 700 MHz band, limit technology options for public safety users, prevent backwards compatibility to existing technology, and preclude use of the widely accepted and TIA/ANSI approved Project 25 Phase I standards.

There is no current ANSI-approved technology that provides one voice channel per 6.25 kHz. Technologies that may someday provide such voice capacity include Ericsson's proposed 2-slot 12.5 TDMA technology, the European TETRA 4-slot 25 kHz technology, and 6.25 kHz FDMA, all of which are being considered as part of Project 25 Phase II. However, those technologies will not be interoperable with each other absent a baseline technology. Project 25 Phase I provides that baseline, and has the added benefit of being an existing ANSI standard. To require one voice channel per 6.25 kHz now would effectively bypass the Project 25 standard, leaving public safety without any current ANSI-approved standards and without a clear path to complete interoperability between competing technologies.

Even Ericsson's 2-slot TDMA fails to provide one voice per 6.25 kHz in all modes of operation at all times. When operated through base station infrastructure, full 2-slot TDMA mode will provide for two voice signals in 12.5 kHz (or one per 6.25 kHz). However, to satisfy the need for unit-to-unit communications without going through the infrastructure (repeaters), the 2-slot TDMA radio effectively becomes one voice channel

in 12.5 kHz.⁷ For a 4-slot TDMA system (TETRA), the problem may actually be worse because now a single unit-to-unit conversation may occupy only one-fourth of the available time in the full channel, but since it is totally unpredictable when that one-fourth time period is occupied, the entire channel may have be dedicated to the one conversation, resulting in one voice in 25 kHz. Furthermore, this problem is not limited to unit-to-unit (tactical) communications. If the infrastructure fails in a TDMA system (*e.g.*, during earthquake, hurricane, or storm), communications load capability will instantly drop to one-half or one-fourth due to the loss of the central synchronizing clock. Of course, those are the times when a public safety communications systems are already pushed to capacity and beyond.

Ericsson's proposal appears to favor its own proprietary TDMA 2-slot technology, which is not an ANSI standard. While TDMA may be an appropriate technology choice for some very large systems, it would be inefficient for most small public safety agencies (which constitute the majority of public safety users), due to the need to aggregate at least two 6.25 kHz channels. There also continue to be substantial questions regarding direct mode unit-to-unit operation in TDMA (noted in part above), which could limit tactical operations and interoperability in the field. Ericsson's 2-slot TDMA approach does have its advantages for certain applications and, for that reason, it is being considered as one possible "track" for Project 25 Phase II. However, for the Commission to mandate one

⁷ The reason is---for TDMA systems to operate, a specific mobile (or portable) radio must receive "clock" input from the infrastructure so as to know when its assigned time slot begins/ends. In unit-to-unit communications, there is no central clock to which all units are synchronized, thus mobile units cannot transmit in a specific time slot because they have no way of knowing when a time slot begins/ends. As a result, it is very likely that a single unit-to-unit conversation, while perhaps occupying only 1/2 the available time, will cross over both timeslots (*e.g.* 60% in timeslot 1 and 40% in timeslot 2). Since the

voice channel for 6.25 kHz at this early stage would unnecessarily and prematurely favor TDMA, while undermining the widespread federal, state, and local support for Project 25 Phase I as the baseline interoperability standard that ties together current and future digital technologies (including TDMA).

III. THE COMMISSION MUST TAKE STEPS TO EXPAND, NOT RESTRICT, OPPORTUNITIES FOR IMPLEMENTATION OF HIGH SPEED DATA SYSTEMS.

APCO's Petition for Reconsideration noted that some regions are likely to require wideband data channels beyond that which are allotted in the Commission's channel plan. APCO recommended, therefore, that RPCs be permitted to consolidate narrowband channels to create additional wideband channels where necessary.⁸ John Powell's Petition for Reconsideration seeks more specific relief, and urges the Commission to increase the number of high speed data (HSD) channels to 28, which is more consistent with the plan originally proposed by the National Public Safety Telecommunications Council (NPSTC).⁹ APCO agrees with Powell's proposal, which will facilitate nationwide implementation of public safety data networks.

Dataradio Group requests that the Commission reduce data efficiency standards to no higher than 1.12 bits/second/Hz for 50 kHz channels or 1.28 bits/second/Hz for 100 kHz channels.¹⁰ Its argument appears to be based largely upon providing service in non-metropolitan areas using its current line of equipment. As previously noted, APCO

amount of crossover is unpredictable, the entire time period must be allocated to that one conversation, hence only one voice channel in 12.5 kHz.

⁸ APCO Petition for Reconsideration at 15 (Dec. 2, 1998).

⁹ Petition for Reconsideration of John S. Powell (Dec. 2, 1998).

expects the demand for HSD channels to be extremely high, particularly in metropolitan and suburban areas. To implement systems at lower efficiencies in this segment of the 700 MHz band will leave many public safety users unserved when the few HSD channels are allocated in each area. As noted by the Commission, the efficiency standards adopted in the *Report and Order* are based on the recommendations of the PSWAC Technology Subcommittee.¹¹ Those standards should not be lowered to meet the marketing requirements of a single vendor.¹²

Ericsson also proposes reducing the HSD spectrum efficiency standard to 1.92 bits/second/Hz and expanding the HSD bandwidth to 200 kHz.¹³ APCO opposes this proposal to lower spectrum efficiency for the same reasons noted above regarding Dataradio. Similarly, APCO opposes increasing HSD bandwidth from 150 kHz to 200 kHz. Such a 33% increase in channel bandwidth, while maintaining the same 384 kbps throughput, not only reduces efficiency, it also reduces the number of available HSD channels per block of spectrum. That will severely impact channel reuse in any given geographic area.

¹⁰ Dataradio Group of Companies Petition for Clarification, at 8 (Dec. 2, 1998).

¹¹ *Report and Order* at ¶37.

¹² However, agencies (particularly those in more rural areas) should be able to implement the technologies described by Dataradio at the lower efficiency rates through aggregating narrowband channels with approval of the relevant RPC.

¹³ Ericsson Petition for Reconsideration at 9.

IV. THE COMMISSION SHOULD MAINTAIN THE REGIONAL PLANNING APPROACH AS ADOPTED.

The Commission adopted rules in the *First Report and Order* to implement regional planning for at least 12.6 MHz of the 700 MHz public safety band. No petitions for reconsideration on this issue were filed by state or local government agencies, or by organizations representing their interests.¹⁴ The only request for reconsideration was from the Federal Law Enforcement Wireless Users Group (“FLEWUG”), which merely urges the Commission to re-evaluate the record, without providing any new information to justify such reconsideration.¹⁵ The Commission should move forward, not backwards, and retain the regional planning approach for the 12.6 MHz. As urged by APCO in response to the Third NPRM, regional planning should also be used for the remaining spectrum in the 700 MHz band.

The Joint Petitioners, while not seeking reconsideration of the regional planning approach, do urge the Commission to extend the period of time permitted for regional planning committee members of multi-state regions to “opt-out” and reformulate a region contiguous with state boundaries.¹⁶ APCO opposes such an extension, as it will cause unnecessary delay in regional planning activity. RPCs that include portions of more than one state will be unable to proceed with organizational matters or preliminary planning activities if there is a possibility that the region will be split into one or more parts. The

¹⁴ This includes the “Joint Commentaries” whose views FLEWUG repeatedly cites in its Petition.

¹⁵ FLEWUG Petition at 7.

¹⁶ Joint Petition for Reconsideration of American Association of State Highway Transportation Officials, *et al.* (December 2, 1998).

impact would go beyond the state seeking to opt out. The remaining portions of the current multi-state region will be “orphaned” and may need to join with other contiguous regions for which the planning process has already begun. In short, the sooner those regions are “fixed” the sooner the critical work of the RPCs can proceed.

V. LOW POWER NARROWBAND OPERATIONS REQUIRE A FREQUENCY SET-ASIDE.

Safety Tech Industries has filed a petition for reconsideration seeking rule changes that would permit assignments for “narrowband nationwide low power channels for on-scene/personal accountability systems.” Such systems would provide for communication with and monitoring of firefighters wearing self-contained breathing apparatus in fire situations. APCO supports this proposal, as it will facilitate an innovative communications capability to protect the safety of firefighters. APCO notes, however, that there are other low power public safety applications that will also need access to the 700 MHz band, including police surveillance and tactical operations, urban search and rescue, and remote control of robotic devices. Therefore, APCO would support setting aside a larger amount of spectrum than requested by Safety Tech to accommodate these additional low power public safety operations. The specific channels to be assigned should be determined by the NCC, to facilitate cost-efficient equipment design for nationwide use.

VI. SWITCHING THE 700 MHz TRANSMIT/RECEIVE FREQUENCIES IS NOT THE SOLUTION TO THE GLONASS ISSUE.

FLEWUG suggests in its petition that the solution to the GLONASS problems raised in the Third Notice of Proposed Rulemaking is to switch the 700 MHz transmit/receive frequencies, and to limit 794-806 MHz to fixed operations.¹⁷ However, the FLEWUG proposal (also advocated by NTIA in its Comments regarding the Third NPRM) is an unnecessary and costly alternative that would limit spectrum availability and interoperability.

As APCO and others noted in their Comments responding to the Third NPRM, the GLONASS second harmonic problem does NOT impact the narrowband voice channels.¹⁸ The only impact is on the wideband data channels. Moreover, placing fixed stations at 794-806 MHz as proposed by NTIA and FLEWUG would require a guard band to protect current mobile operations above 806 MHz, thus reducing overall spectrum availability. Relegating mobile frequencies to 764-776 MHz would also make it far more difficult for manufacturers to produce radio equipment that spans both the 700 MHz and 800 MHz bands, undermining a major interoperability goal of the 700 MHz band allocation.¹⁹ The FLEWUG proposal also fails to account for portable-to-portable (or mobile-to-mobile) “talk around” capability, which requires one unit to operate in a transmit mode, 30 MHz

¹⁷ FLEWUG Petition at 24.

¹⁸ See Comments of Motorola (Jan. 19, 1999).

¹⁹ Moving mobile use to 764-776 MHz would also expose sensitive mobile operations to two “band edges” (*i.e.*, 763 and 777 MHz) occupied by unknown and potentially interfering commercial services, rather than the single unknown “band edge” at 794-806 MHz (*i.e.*, 793 MHz).

removed from the receiving unit. In other words, because of the need for “talk around,” there will always be mobile/portable use in the 794-806 MHz band. Such “talk around” is essential for public safety field operations, whether at a crime scene, fire, or other emergency.

CONCLUSION

For the reasons discussed above, the Commission should reject those petitions for reconsideration that would undermine the ability of public safety agencies to implement interoperable radio communications facilities as quickly as possible in the 700 MHz band.

Respectfully submitted,

**ASSOCIATION OF PUBLIC-SAFETY
COMMUNICATIONS OFFICIALS-
INTERNATIONAL, INC.**

By:

Robert M. Gurss
WILKES, ARTIS, HEDRICK & LANE,
Chartered
1666 K Street, N.W. #1100
Washington, D.C. 20006
(202) 457-7329
rgurss@wahlone.com

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