

FEDERAL COMMUNICATIONS COMMISSION

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PUBLIC SAFETY NATIONAL COORDINATION COMMITTEE

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TECHNOLOGY SUBCOMMITTEE

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THURSDAY
JANUARY 31, 2002

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The Technology Subcommittee met in the Commission Meeting Room, Federal Communications Commission, 445 12th Street, S.W., Washington, D.C. at 10:48 a.m. Glen Nash, Subcommittee Chair, presiding.

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1 P-R-O-C-E-E-D-I-N-G-S

2 10:48 a.m.

3 CHAIRMAN NASH: The Technology
4 Subcommittee meeting will come to order.

5 I suspect this meeting will be shorter
6 than the Interoperability Subcommittee was, and that
7 the only two items that I have on the agenda is the
8 report from TIA on their work on the wide-band data
9 standard for the interoperability channels and then,
10 secondly, we have received the recommendation back
11 from the Interoperability Subcommittee that, relative
12 to the encryption standard, that radios be capable of
13 operating, if you're going to use encryption on the
14 700 megahertz interoperability channels, then you must
15 be capable of operating in the AES mode and capable of
16 operating in the triple DES and DES modes of
17 operation.

18 I will get together with Eric Zioco, who
19 chairs the TIA Committee -- not anymore? Okay, I'll
20 deal with Richard then, and we will come up with
21 proper description of the TIA documents that describe
22 those three modes and bring that back to the Committee

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1 at our next meeting for formal adoption of a
2 recommended change to Section 90.553 of the FCC rules
3 that currently describe, requires the use of the DES
4 mode on the interoperability channels.

5 MR. WILHELM: Glen, excuse me. Since our
6 next meeting is May at the earliest, I wonder if we
7 could circulate this electronically and have it before
8 the Subcommittee, before the Steering Committee
9 rather, electronically, so they can get a timely
10 recommendation to the FCC?

11 CHAIRMAN NASH: I am agreeable to that, if
12 everyone else is.

13 MR. BUCHANAN: All we are clearly saying
14 is we just need the right TIA document numbers.

15 CHAIRMAN NASH: Right, you know, come up
16 with the proposed, the recommended language change to
17 the rules, which has got to reference the appropriate
18 documents per TIA. So I will get with Richard and
19 come up with that, and we will electronically
20 circulate a recommended change then.

21 MR. WILHELM: Okay. Then we can have a
22 conference bridge of the Steering Committee and get a

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1 recommendation to the FCC.

2 CHAIRMAN NASH: Okay, that's fine. And
3 that's agreeable to everyone?

4 Very good. So that will come out on the
5 Technology Subcommittee web server for review
6 hopefully within the next week or so.

7 All right, with that, that leaves us just
8 the one item. So, Wayne, if you would make your
9 report on TIA's progress, please?

10 MR. LELAND: Sure. Wayne Leland. I chair
11 the Private Radio Section for TIA.

12 General Oblak couldn't make it today, so
13 I'm going to give the -- and John chairs the TIA
14 Technical Committees for TIA, and John couldn't make
15 it today, so I'm going to give the update. I have a
16 couple of people that attend the TIA meetings. Ernie
17 Hofmeister is going to bale me out if we get into
18 technical discussions here on that.

19 But if I could have on one of the screens
20 or the other put up the -- I can't see it. Where is
21 it? Oh, there it is. I saw the print continuing, so
22 I figured it wasn't there.

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1 MR. SCHLIEMAN: I'm running the slide for
2 you.

3 MR. LELAND: Oh-oh.

4 (Laughter.)

5 Okay, if you could go to the next slide --
6 that's the introduction slide.

7 Things that were accomplished within
8 TR8.5, which is doing this, the wide-band standards,
9 since we last reported to NCC, include the publication
10 of the wide-band shell standards and definition. That
11 was published by TIA in December of 2001 as a TSB
12 identified there.

13 In the wide-band, physical layer
14 specifications, SAM, Scalable Adaptive Modulation, was
15 approved for TIA publication in January, two weeks ago
16 at the meeting. So that is in process to be
17 published.

18 IOTA, the Isotropic Orthogonal Transform
19 Algorithm, is in ballot process. The ballot has
20 closed and will be discussed at the April meeting.

21 Also with NTR8.5, since there are both of
22 these proposals still in play, there is an agreement

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1 that at the April meeting it will be selected, down-
2 selected to one for a recommendation to NCC as the
3 standard, and I think we're pretty confident that that
4 will happen.

5 The wide-band MAC, Media Access Control,
6 the first draft has been released in December.

7 Next slide, please.

8 The Higher-Layer Standards Convergent,
9 everyone has agreed to converge on that, all the
10 various proposals. They are meeting, as it is stated
11 up there, more often than the TIA meetings, which take
12 place about every three months. They're doing semi-
13 weekly calls and continuing on that.

14 The physical layer performance on the
15 bottom, first drafts have been submitted for
16 transceiver methods of measurement and performance
17 recommendations, and then adjacent channel performance
18 rules are targeted to get industry input and consensus
19 on that.

20 Next slide, please. This is just kind of
21 a checklist. The bottom legend is green as its
22 completed task. Purple is a task started. We always

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1 have trouble with this. And red is at risk. There
2 are no reds, so we won't mix things up in there. They
3 are purple.

4 So the TIA deliverables for the second
5 half of 2001 that have been met: the wide-band data
6 system and standards definition, TSB, the ballot of
7 the physical layer specs and technology proposals for
8 the MAC and LLC layer.

9 In the first half of 2002, the first
10 three, the physical layer has been started. The
11 adjacent channel performance recommendations have been
12 started. Wide-band interface overview, TSB, has been
13 started as well.

14 Then things yet to be started will be the
15 remainder down there: the ballot of the MAC and LLC
16 layer specifications, technology proposals for other
17 higher-level layers, and the text messaging
18 applications.

19 Next slide, please. In the second half of
20 2002, again, some of the higher-level layers: wide-
21 band MAC and LLC, TIA ballot of the wide-band MM and
22 PDS layer standards, and TIA ballot of the wide-band

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1 text messaging specification standards, those were the
2 ones that were going to be submitted and debated, if
3 you recall, in the first half.

4 In the first half of 2003, wide-band data
5 transceiver methods of measurement and transceiver
6 performance recommendations and air interface
7 conformance of the TIA standard. Now I understand
8 there was some discussion this morning going on about
9 the application layer. Again, this does not include
10 application layers. It really includes the protocols,
11 which have to be in place before you can define any
12 application. I don't know if you want to discuss that
13 or not.

14 First of all, are there any questions on
15 the presentation?

16 CHAIRMAN NASH: Wayne, I think one of the
17 questions that had come up was, is it critical or does
18 it make any difference to the work you're doing as to
19 whether or not we will be focusing on the
20 interoperability channels, the interoperability modes
21 fitting into the 50 kilohertz-wide channel, or do we
22 need the 150 kilohertz-wide channel, which really

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1 becomes an issue of the amount of throughput that has
2 to go through, as to what the applications are we're
3 trying to support with the interoperability channels.

4 But I guess one of the questions, as we
5 get back down toward the transport layers and that, is
6 there a significant difference, say in the SAM
7 modulation schemes, or whatever, as to whether or not
8 we're talking about a 50 kilohertz-wide --

9 MR. LELAND: Yes, I don't believe it
10 affects this work, what the channel width is, and I'll
11 ask Ernie or anybody else to confirm that. It's not
12 going to affect the protocols. I mean it would affect
13 the applications, obviously, et cetera.

14 I would offer a personal opinion, having
15 not been here this morning for the debate, and that's
16 on the interoperability that says I think you've got
17 to go to the least common denominator, which in my
18 mind is 50 kilohertz. Now if everybody at a scene,
19 and whatever, has 150 kilohertz and the same
20 application layer, then I think you can, on the 50
21 kilohertz channel or on the voice channel for the
22 matter, agree to operate at other than that baseline

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1 interoperability.

2 But, again, if you look at the least-
3 common denominator, there's going to be some places
4 and some people that will probably only have 50
5 kilohertz allocations on some of these channels.

6 CHAIRMAN NASH: In a way you're getting to
7 the heart of the question. As we're all aware, the
8 FCC rule requires that every radio be capable of
9 operating on the interoperability channels. So to the
10 extent that we define operations on the
11 interoperability channels as requiring 150 kilohertz
12 operation or requiring only 50 kilohertz operation, we
13 place a burden then on radios that are marketed for
14 the general use channels to be capable of operating in
15 either or both of those two modes.

16 MR. LELAND: Right.

17 CHAIRMAN NASH: So, again, if you had a
18 small user who only had a need on those general use
19 channels for a 50 kilohertz operation, but we had
20 defined interoperability as being 150 kilohertz-type
21 applications, then his radio would have to be capable
22 of that mode of operation.

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1 MR. LELAND: Not only the radio, but the
2 applications. You would have to have, it would
3 probably be one set of applications for 50 kilohertz
4 and another for 150, is my guess.

5 CHAIRMAN NASH: And that's a very good
6 point. You know, as we get into -- if we say that
7 interoperability includes video, we need to be very
8 careful at least as to how we describe those
9 applications, because if we say that video is a
10 requirement on the interoperability channels, then
11 every radio out there has to be equipped and capable
12 of carrying video. So we have to be very careful at
13 how we craft --

14 MR. LELAND: Right.

15 CHAIRMAN NASH: -- that support, but,
16 again, just at the transport layer, kind of a question
17 came up of, if we define the interoperability mode as
18 being capable of carrying 384 kilobits per second,
19 therefore, is 150 kilohertz-wide channel, are we
20 placing a burden then on radios that are designed for
21 some user who only, let's say, has a 50 kilohertz-wide
22 general use requirement?

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1 MR. LELAND: Well, it is a different
2 question than you asked me the first time. The first
3 time you asked, is there something going on in the
4 work we're reporting on within TIA that would be
5 affected, whether you chose 50, 100, or 150, and I
6 think the answer is no. If you say, is there a burden
7 put on a radio of choosing those different standards,
8 I would ask the different radio manufacturers to kind
9 of answer that. My guess is probably somewhat of a
10 burden. I don't know.

11 Dave, do you have any comments? This
12 David.

13 MR. BUCHANAN: That would really help us,
14 because not knowing what the burden is, we don't know
15 how far to go, because that's one of the questions I
16 have had. So if you have any idea --

17 MR. LELAND: Or maybe Ernie's standing up
18 here to help.

19 MR. HOFMEISTER: Yes, Ernie Hofmeister,
20 M/A-COM.

21 In terms of 50, 100, or 150 kilohertz
22 operation, I guess I think of that as sort of that's

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1 sort of a fundamental requirement. The standard is
2 being developed to adapt to any of those channels, the
3 modulation, the bit rates, and so on. We know those
4 will be the case in the general use channels. So I
5 don't view that as too much of a burden. If you would
6 reduce it to only 50 kilohertz, that probably would
7 save a little bit, but I'm not sure that it's -- that
8 might put more restrictions on him than you might want
9 to do.

10 CHAIRMAN NASH: Ernie, I guess let me
11 rephrase the question. Do you as manufacturers
12 foresee the possibility of having, if you will, a low-
13 end product that might offer a smaller agency only 50
14 kilohertz, you know, data services that would fit into
15 a 50 kilohertz channel, as opposed to possibly
16 offering a higher-end radio to a larger agency that
17 would support going up to the 384 kilobit-per-second
18 rate?

19 Do we see a difference in product lines
20 out there, and my concern is that, again, if there is
21 a potential for a, quote/unquote, "low-end" product at
22 the 50 kilohertz level, if we put an interoperability

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1 burden on there that requires 150, does that eliminate
2 the, quote/unquote, "low-end" product?

3 MR. HOFMEISTER: Yes, I think the last
4 part of your question, if you put the burden for 150,
5 does that eliminate the probability of a low-end
6 product, certainly if you have to operate, for type
7 acceptance, if you have to operate on 50, 100, and
8 150, or 150, that certain means you have to build all
9 that capability into the radio. I think tiered radio
10 products are something that we always think about as
11 manufacturers and in the market. If there is a market
12 segment that could use that, certainly that could be
13 an attractive feature.

14 I guess in my own mind, as I said earlier,
15 I have sort of already gone beyond that, that the
16 basic radio had to have all those capabilities in
17 there just to satisfy what I believe to be the
18 interoperability requirements here.

19 MR. BUCHANAN: Could I make a comment?

20 CHAIRMAN NASH: Yes, Dave.

21 MR. BUCHANAN: I know from our own work in
22 Southern California on regional planning and what we

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1 gathered, input from agencies for wide-band data, the
2 vast majority of people just went ahead and asked for
3 the 150 kilohertz wide. There wasn't that much demand
4 for the narrow channels. I think they were all
5 looking at needing to do the maximum amount of data
6 throughput based on the demands that are coming down,
7 particularly from law enforcement.

8 So I am not sure if there is going to be
9 that -- if there is not a giant differential in cost,
10 I'm not sure there's going to be that much demand for
11 the narrower channels. I think if you said, yes, the
12 price may be tripled or quadrupled to get 150
13 kilohertz instead of 50 kilohertz, then agencies may
14 think about it twice. But if you say there's a 10 or
15 20 percent differential, I don't think that's going to
16 be much of an issue with anybody.

17 MR. LELAND: Let me just comment here.

18 CHAIRMAN NASH: Yes, go ahead, Wayne.

19 MR. LELAND: Because within TIA and I
20 think probably here, because it was with TIA members,
21 we are by rule kind of prohibited from getting into
22 cost and price kinds of discussions because TIA is

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1 exempt from anti-trust rules. One place where the
2 manufacturers can, in fact, get together and discuss
3 standards -- they can't get together and discuss price
4 and cost. So we kind of steer clear of that.

5 You could have individual companies kind
6 of comment on that to you, but I would do it in a more
7 private forum.

8 CHAIRMAN NASH: Wayne, let me carry then,
9 again, this idea of system design. I understand that
10 everybody is looking at asking for 150 kilohertz-wide
11 channel because those are available, and certainly
12 having the ability to carry more data has certain
13 intriguing thoughts about it. But are we going to get
14 into tradeoffs in system design to where, if you're
15 going to build a system that's going to support a 150
16 kilohertz-wide operation, maybe you're going to have
17 to have, you know, pick a number, six times the number
18 of bay stations in order to have adequate performance,
19 and again a small, more rural agency that doesn't have
20 the need for all of that data may want to make some
21 choices about the overall cost of their system design,
22 not only on the quality of the radios they buy, but

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1 also just how much they put into the basic
2 infrastructure in order to make it work?

3 Again, we get into, the question I was
4 trying to pose in the Interoperability Subcommittee
5 this morning was, as Bob has pointed out,
6 interoperability is the lowest common denominator mode
7 of operation. I am trying to get that defined so that
8 we know what we're requiring radios to be capable of
9 doing as a minimal level of performance, because
10 that's what the interoperability mode should be. It
11 defines the minimal level of performance for every
12 radio, and then there may be enhanced performance
13 that's above that, based upon individual agency
14 requirements.

15 MR. LELAND: Yes, I think you have made a
16 good point there. Clearly, the sensitivity and,
17 therefore, the power you have to emit goes up and the
18 sensitivity goes down for, or also it gets worse, for
19 the wider the bandwidth you go. So there clearly is
20 some penalty, and I don't know what that penalty is
21 offhand, for going within the infrastructure, if
22 you're trying to design to a certain coverage area,

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1 and you go wider bandwidth as opposed to narrower
2 bandwidth.

3 MR. HOFMEISTER: Ernie Hofmeister, M/A-
4 COM.

5 Just a comment on that, I think probably
6 on the record some of the original SAM proposal
7 material by Motorola does give some depiction of what
8 your ranges are and coverage ranges for those
9 different conditions.

10 MR. LELAND: Yes, that is true. In fact,
11 the SAM does adaptive modulation. That's what's in
12 the title. If it is high signal strength, it will go
13 up to higher bit rates, regardless of whether it is
14 50, 100, 150, and it will scale itself down
15 automatically when the signal strength gets less.

16 So, also, I would caution you in talking
17 about, do you have to go to very wide bandwidth to get
18 video, everybody talks about, what video are you
19 talking about? Single-frame, couple-of-frames-per-
20 minute, et cetera, and over what range? If it is very
21 close in range, there's lots of things that could be
22 done.

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1 MR. SCHLIEMAN: Does that imply that a
2 same radio will always be 150 kilohertz channel width
3 and that the modulation would change dynamically
4 according to the signal conditions or that the
5 bandwidth of the radio will actually dynamically
6 change?

7 MR. LELAND: David is going to answer
8 that.

9 MR. EIERMAN: David Eierman, Motorola.

10 I am not quite sure that -- even though
11 the standard defines nine different modes, I am not
12 sure that we have decided that every radio is going to
13 have all nine in them. I think we will see some type
14 of tiering, anything from integrated voice and data on
15 narrow-band channels to data-only radios on narrow
16 band, and then radios that do something on wide band.

17 I don't know at the moment whether they're going to
18 be one radio that does everything or radios that only
19 do certain bandwidths in certain modulations from
20 different manufacturers.

21 MR. HARASETH: Ron Haraseth, APCO.

22 Bringing up the spectrum efficient, the

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1 coordination aspect of this, and the radio use and
2 efficiency of channels is obviously going to be
3 greater at 50 kilohertz. Glen started this round of
4 conversation, which all relates to that, and my
5 question is the same thing I think that Dave was
6 trying to answer: Is the SAM, Scalable Adaptive
7 Modulation, standard, can it be set programmatically
8 and limited to 50 kilohertz channels for those people
9 that are only going to need or require a 50 kilohertz
10 channel, and thusly, maximize the reuse of the
11 frequencies in those areas, where they don't
12 absolutely have to have a wide-band 150-kilohertz
13 operation? If that is so, then I would imagine that
14 there is an interoperability mode within SAM that
15 would scale back to 50 kilohertz as the basic common
16 denominator. Just things to think about.

17 MR. BUCHANAN: Let me comment before the
18 next person. I guess you haven't decided between SAM
19 and this IOTA standard. So I guess it applies to
20 whichever one you, what we're almost saying, to
21 whichever one you pick in TIA.

22 Glen and I were just talking offline. I

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1 guess we need to dig out the documents again that we
2 worked on for the needs, and it included data, I
3 remember, but I don't remember all the details because
4 it has been well over a year since I've bothered to
5 look at it. But I think we need to review that, and
6 it looks like what we needed to decide is, if it is
7 video, what kind of video compression algorithm we're
8 going to look at as a standard. I think somebody else
9 mentioned that; I forget who now, but that's an
10 important point.

11 Then from that I suspect video is going to
12 be the one that drives the amount of bandwidth we
13 need, the amount of throughput we need. So I think
14 data will probably help us make this determination.

15 I still worry; I understand Wayne's point
16 on the cost, and we can talk in the TIA forum about
17 that, but obviously cost is an issue. If we are going
18 to significantly drive up the cost of radios, we need
19 to be careful about that also.

20 Go ahead, Sean.

21 MR. O'HARA: A couple of things. Sean
22 O'Hara, Syracuse Research Corporation.

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1 I think speaking to both SAM and IOTA, I
2 mean, typically, with these OFDM modulations, you tend
3 to keep a constant bandwidth which is related to your
4 block, your symbol blocks. What you do is you change
5 the symbol complexity for each slow carrier, and
6 that's how you write up your data rates up and down.
7 Is that correct? Is that what you're saying?

8 MR. BUCHANAN: Basically.

9 MR. O'HARA: So you're keeping the same
10 bandwidth and your modulation complexity in your
11 subcarriers is going up and down based upon signal
12 strength.

13 Secondly, I think the question is, if
14 video is a requirement for interoperability channels,
15 I think the big question is, well, what is the video?
16 What's the video quality? What's the frame rate?
17 What's the resolution? Because that drives the actual
18 end-user data throughput that's after error
19 correction, retransmissions, and all that stuff, and
20 that's really going to determine the bandwidth and
21 what it takes to get there more than anything.

22 So I think just saying video, that doesn't

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1 tell us whether or not we could even use the 50
2 kilohertz channels, which I doubt, for any kind of
3 usable video, but it depends on how you define video;
4 it really does.

5 MR. BUCHANAN: Yes, you are correct. I
6 think we did some definition, but, again, we've got to
7 pull the old documents out. I will do that and get
8 them on the list servers, so that we can review them
9 and then go from there, see if they need revisions or
10 whatever.

11 Go ahead, Dave.

12 MR. EIERMAN: David Eierman, Motorola.

13 One of the considerations is spectrum
14 congestion. I mean 12 megahertz of wide-band data
15 really is not very much. It may end up that the
16 regions may decide that they're going to use a
17 narrower bandwidth, 50 or 100 kilohertz, for the bulk
18 of the channels and set aside some wide-band channels
19 for users that really need high-intensity bandwidth.
20 I mean I don't know that we've come to a point where
21 we're saying the only channels are going to be 150
22 kilohertz.

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1 The second point, I think there's some
2 misunderstanding about what the FCC rules currently
3 say about wide band. I don't think the FCC rules are
4 finished regarding wide band because several reasons.

5 They only have ACCP tables for 150 kilohertz
6 bandwidth. They have not defined the ACCP tables for
7 50 or 100. They only defined the data rate at the
8 widest bandwidth. They identify the I/O channels.

9 The reserve spectrum is still sitting
10 there, and going all the way back to the first Report
11 and Order, there is a statement in there; we actually
12 declined to require that wide-band radios, all wide-
13 band radios must operate on the wide-band I/O
14 channels. The rules do not say that. They do on
15 narrow band, but they are quiet on wide band. The
16 statement in the first Report and Order says that that
17 needs to be re-evaluated at a future date.

18 CHIEF McEWEN: Chief McEwen, IACP.

19 First, let me clarify that, don't assume
20 that whatever I say means that I understand anything
21 about what you're talking about.

22 (Laughter.)

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1 You're absolutely right, David. On the
2 other hand, I'm not sure that any of you know what I'm
3 talking about.

4 (Laughter.)

5 So let me try. I look at it a little bit
6 more simplistically, in the sense that when you start
7 separating out -- I think of video as generally
8 streaming video, broad-band, you know, like I watch on
9 the television, good quality, streaming video, I mean
10 to some extent.

11 Already you're shaking your head.

12 (Laughter.)

13 I am thinking in terms of the fact that we
14 have been having discussions with the Commission about
15 the need for a 4.9 gigahertz spectrum for broad-band
16 applications, which we have none now. We have no
17 spectrum that would allow us to reasonably do that
18 kind of application.

19 I don't think in the wide-band application
20 I have ever envisioned the same level of quality or
21 service or delivery of video that we would envision in
22 that broad-band environment. I don't know that there

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1 is a real need for it generally. You might need
2 photographs. You might need, like you say, some
3 snippets and some other things, but true ongoing
4 streaming video, it seems like almost somewhat of a
5 waste of that spectrum.

6 So that's just my -- I mean from a police
7 operational perspective, there are lots of things we
8 would like to send, pictures of things and other kinds
9 of things that we need in real-time quickly that wide
10 band would provide for us that we can't reasonably do
11 now, but I think when you talk about streaming video,
12 I'm thinking more of broad-band application rather
13 than wide-band.

14 So I think you need to kind of think about
15 that. Otherwise, we are trying to build something
16 that I think is going to take up a lot of spectrum to
17 do something that may be not that practical.

18 CHAIRMAN NASH: Chief, thank you for
19 getting down to the question that I've been asking:
20 What are the applications that we need to support on
21 the interoperability channels?

22 MR. BUCHANAN: Again, we addressed that,

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1 and it was in there. The Chief's right, we didn't say
2 that this would support full-frame, full-rate video
3 signals, but I think we did envision there are some
4 fire applications, I know, where they need more than
5 just short-range, and they need to bring back thermal
6 imaging and some of that, but it doesn't have to be a
7 high-frame-rate-type thing.

8 I think that, again, we've got to dig out
9 those documents, and then we can refresh our brains
10 and then go from there. If we didn't cover
11 everything, or if we didn't do it in enough detail,
12 then we need to revisit it.

13 CHAIRMAN NASH: Go ahead, Ernie.

14 MR. HOFMEISTER: Ernie Hofmeister, M/A-COM
15 Wireless.

16 Not on that issue, but just to go back to
17 Ron Haraseth's question and I think the TIA response
18 to the request from the NCC, I think the TIA
19 interpreted the NCC request as that there should be a
20 flexible standard that could operate in 50 kilohertz,
21 100, and 150 kilohertz channels that's been designed
22 that way, so it is flexible to operate on those

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1 channels, just as if there are 50, 100, 150 kilohertz
2 channel possibilities in the general use channels.

3 So to Ron's question, it will operate in
4 the 50 kilohertz, both. In fact, whether it's the SAM
5 or whether it's the IOTA physical layer, either one of
6 those will operate that way.

7 CHAIRMAN NASH: I guess, though, in
8 response to that, certainly that's what we asked TIA
9 to do for us. When I get down to the practicality of
10 looking at the I/O-specific channels, and in the rules
11 we need to define a mode of operation that allows for
12 interoperability on those specific channels. Now
13 maybe we say that interop channel No. 1 is a 50
14 kilohertz wide channel and channel No. 3 is a 150
15 kilohertz wide channel, and you operate on the one
16 that's appropriate to what you're doing. That's
17 certainly an option.

18 But I think somewhere in the rules we need
19 to define the technical specs about what is operation
20 on those interoperability channels. That is what we
21 are trying to get down to here, are some of those
22 decisions.

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1 MR. HOFMEISTER: Yes, I think I would
2 agree with that. I would just comment on the TIA.
3 The TIA is providing a standard that is capable of
4 channeling all those options.

5 MR. BUCHANAN: Has TIA got so far as,
6 between these two different modes that you're looking
7 at, do we know what the throughput is at the different
8 bandwidths even though it is not a standard yet? Is
9 there something that we could go with to start
10 working?

11 I know that at the 150 kilohertz wide it
12 is supposed to be 384 kilobits or better, but we have
13 never really talked about how much we get at 50
14 kilohertz or --

15 MR. LELAND: I know for the SAM, the
16 Motorola proposal, there is a table that has been
17 presented that lists for each bandwidth, 50, 100, 150,
18 three different data rates, depending upon the signal
19 strength and the approximate range. They go to -- I
20 forget what the numbers are, how high it goes, but
21 600, 690 kilobits in the best case. Over time that
22 may improve as the technology improves.

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1 IOTA, I don't remember if they have put
2 that forward, but it should be similar. There's
3 nothing magic to it. It's bandwidth, signal strength,
4 and --

5 CHAIRMAN NASH: Wayne, is there also a
6 speed-of-travel limitation or impact?

7 MR. LELAND: Well, sure. It will affect
8 throughput. You know, it will affect throughput,
9 which means for the error correction you will have to
10 go back and things will slow down. You will still get
11 it there, but it will come through. It's just like
12 multi-path and all those things.

13 I wanted to make a comment, too, in
14 support of what Chief McEwen said. If we go back to
15 the original PSWAC report, a conclusion was that
16 public safety needed, I think the number was 97.5
17 megahertz of additional spectrum, and the first 25, of
18 which we have 24 allocated but not all available, as
19 we know that, was this: If you looked at where PSWAC
20 came in and said, if you looked at voice channels
21 versus data, most of it was due to data. Most of the
22 additional spectrum was due to data, and a significant

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1 portion was due to the high-speed streaming video-type
2 applications that Harlin pointed out.

3 I think you have to be careful trying to,
4 even though the Commission tends to make statements
5 that say you have enough, I don't think you can cram
6 all that stuff into this 24 megahertz. So you've got
7 to be very careful about that or you will wind up with
8 stuff allocated and people that won't be serviced at
9 all because they have been allocated, and et cetera.
10 So it is just another consideration.

11 MR. BUCHANAN: No, that is totally
12 correct. I don't think we're arguing about that at
13 all. I think all we're trying to look at is going
14 back, now that we are getting more information on the
15 standard as to what we really can do, and to what
16 extent we want to do it on the band.

17 Is there any way we can get those charts
18 or something preliminary that we can work with in
19 Interoperability and this Committee?

20 MR. HOFMEISTER: Sure. Ernie Hofmeister,
21 A/M-COM Wireless.

22 I think I can answer it. There is quite a

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1 body of technical information available about all,
2 these two proposals for the physical layer, plus a
3 couple of others that are maybe not in consideration
4 right now. So certainly that body of information or
5 parts of that can be provided.

6 One consideration might be, if the TIA
7 does, as we say we're going to do in April and selects
8 one of those to go forward, it may be appropriate to
9 not dig in too much to the second one, or whatever, to
10 both of them until you have one.

11 But I think the TIA, from all these TR8.5
12 Committee meetings, has a body of information, more
13 information than you might want to dig into.

14 (Laughter.)

15 MR. BUCHANAN: We kind of like the
16 selected, pared-down version of it.

17 MR. HOFMEISTER: One more comment, I
18 guess, just in terms of the activity at the TIA. I
19 mean, NCC has been sort of imposing a sense of urgency
20 on the TIA to get this done. I think that is
21 happening.

22 If you look at the TR8.5 Subcommittee

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1 meeting, I think it runs like two-and-a-half hours now
2 and is fully loaded, probably the most active
3 Subcommittee, probably TIA meetings that are going on.

4 MR. BUCHANAN: I was just shown some of
5 the charts. Maybe we will get a hold of some of that
6 and dig out the old stuff, and then go from there,
7 Glen, and see where we're at.

8 CHAIRMAN NASH: Okay, Dave, if you're
9 working, we will continue taking a look at that.
10 Again, at some point we are down to considering, I
11 think, some of the tradeoffs that are going to have to
12 be made about throughput versus applications. The
13 applications side comes from John's Committee, but the
14 decisions made there have an impact on how we push
15 forward.

16 MR. BUCHANAN: Yes, well, since I am
17 chairing both work groups, in the Interoperability and
18 this one, it tends to blend together. So I'll just
19 get the whole thing out and get it to both groups, and
20 we will work on that between now and the next meeting
21 and try to have some recommendations for the next
22 meeting.

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1 CHAIRMAN NASH: Earlier Dave Eierman made
2 a comment that really caught my attention, was that
3 the rules do not require radios built in the wide-band
4 channels to have interoperability. I will take him at
5 his word on that. It is being confirmed by others.
6 That certainly raises some interesting questions here
7 of, why are we doing this? If interoperability is
8 optional, then why do we need to have a standard for
9 interoperability maybe? That may be a question we may
10 need to go back and re-address as to a recommended
11 rule change.

12 MR. BUCHANAN: I don't think the
13 Interoperability Subcommittee realized that -- I don't
14 know if John is still around, but --

15 CHAIRMAN NASH: He's over there.

16 MR. BUCHANAN: Did you realize that, John?
17 No? It is probably something we ought to reconvene
18 and maybe make a recommendation, because I don't think
19 that is the way we thought things were going. I think
20 we thought that it was that the wide-band data was
21 mandatory. If you had a wide-band data system, that
22 you would have the wide-band interoperability channels

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1 in your radios.

2 MR. SCHLIEMAN: Actually, the way the
3 90.547 reads, "Except as noted in the law, mobile and
4 portable transmitters operating in 760 port at 776
5 megahertz and 794 to 806 megahertz frequency bands
6 must be capable of operating on all of the designated
7 nationwide narrow-band interoperability channels,
8 pursuant to the standards specified in this part."

9 I believe that was one of the recon
10 petitions.

11 MR. SPEIDEL: No, we submitted it. We put
12 in a request for rulemaking on that, or clarification;
13 I forget exactly what it was. Because you look at
14 that, and you can really interpret it as the wide-band
15 transmitters have to have narrow-band capability, but
16 they're not required to have wide-band capability.

17 MR. SCHLIEMAN: So the \$64,000 question
18 is, did you get a response?

19 MR. SPEIDEL: There has not been anything
20 done yet, Robert, yes. That was submitted -- and I
21 will be more than happy to give anybody a copy of that
22 petition that I put in -- I think that was submitted

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1 about almost a year ago, to try to just get the
2 English done.

3 First of all, I want to say what David
4 said is absolutely correct, and as Bob just recited
5 it. There is no corresponding rule which says wide-
6 band receivers/transmitters must have the capability
7 of operating on the designated wide-band
8 interoperability channels.

9 We have just been assuming that there
10 would be a rule like that coming forth because there
11 are designated wide-band interoperability channels,
12 even though there's no requirement to do anything with
13 them. So we assume that maybe when they get something
14 here from TIA that they will say, okay, we want wide-
15 band transmitters to have this capability.

16 But maybe it is a fair question, is to go
17 back and say, as Dave pointed out, in the first Report
18 and Order they indicated that that was a question that
19 they would look at later. Maybe we want to submit a
20 recommendation back through the NCC, the general
21 Committee, to say, hey, we would like to get some
22 guidance.

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1 Are we correct in our assumption that
2 there will be a requirement someplace in the future?

3 CHAIRMAN NASH: Bob has moved there, but,
4 as I recall, radios are required to operate on all of
5 the interoperability channels except as noted below.
6 Since wide-band was not listed as an exception, one
7 might interpret that to mean that wide-band must be
8 capable of operating not only in the wide-band
9 interoperability channels, but also on the narrow-band
10 interoperability channels.

11 MR. SPEIDEL: Exactly, and that was
12 pointed out in --

13 CHAIRMAN NASH: Which is an undesirable.

14 MR. SPEIDEL: Yes, we pointed that out in
15 our petition.

16 CHAIRMAN NASH: So I think we do need to
17 go back and look at that entire language. I do recall
18 that we had, kind of this issue came up in San
19 Francisco, and we discussed, we at least discussed in
20 the Committee the fact that narrow-band voice radios
21 -- you know, radios that were capable, were designed
22 for narrow-band voice would have to have narrow-band

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1 voice interoperability.

2 MR. BUCHANAN: And not data.

3 CHAIRMAN NASH: And not data. Radios
4 designed for narrow-band data would have to have
5 narrow-band data interoperability, but not necessarily
6 voice. So, therefore, by definition, if you have both
7 narrow-band voice and data, then you had to have both
8 narrow-band -- you know, interoperability.

9 But I think we also said that wide-band
10 channels, you know radios, would only have to have the
11 wide-band mode. At least that was the discussion in
12 Committee, and it doesn't appear that that got into
13 the rule.

14 MR. BUCHANAN: And I don't know if we made
15 -- I can't remember if we made any recommendation to
16 the NCC Steering Committee on the wide-band. I think
17 we focused just on the narrow-band and hadn't really
18 considered the wide-band at that point.

19 CHAIRMAN NASH: It would appear to be
20 something that does need to be cleaned up.

21 CHIEF McEWEN: Chief McEwen.

22 When you talk about, I mean putting aside

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1 the narrow-band issues, I think what you just said I
2 generally agree with. It needs to be made clear.

3 But when you talk about wide-band, explain
4 to me what you're saying right now, forgetting the
5 narrow-band interoperability issues in that area. Are
6 there interoperability requirements in wide-band right
7 now?

8 MR. BUCHANAN: Right now the way the rule
9 is, from what Bob just read, and backed up by others,
10 if you buy a wide-band data radio system, there is no
11 requirement, although the radio has to be capable of
12 the channels, there's no requirement -- well, it
13 doesn't even have to be capable of even having the
14 wide-band interoperability channels at all. So
15 there's no corresponding mandate like there is for the
16 narrow-band data for the wide-band, and that's the
17 problem.

18 MR. SCHLIEMAN: There is a problem the way
19 the rule is written --

20 MR. BUCHANAN: Yes.

21 MR. SCHLIEMAN: -- and it's been requested
22 to be clarified, and the response has not been

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1 forthcoming yet, although it has been quite a while.
2 So we need clarification so we can make appropriate
3 recommendations.

4 CHIEF MCEWEN: Putting aside all of that,
5 forgetting about what the rule says or what it doesn't
6 say or anything else, my question is a very practical
7 one: We really need to think this out again and make
8 sure that we're going to get the right result here.

9 I am a little bit confused. I mean, I can
10 see really two sides of this as it relates to
11 interoperability on wide-band channels. Do you know
12 what I'm saying? Not voice narrow-band; I'm talking
13 about the ability for one agency to be able to
14 interoperate with another agency on wide-band
15 applications. I am not clear whether you're saying
16 that is provided for.

17 CHAIRMAN NASH: And, Chief, I'm not sure,
18 and I objected earlier to technology issues coming up
19 in the Interoperability Committee, this is an issue
20 that belongs in the Interoperability Subcommittee.

21 CHIEF MCEWEN: Right.

22 CHAIRMAN NASH: And it really should be

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1 discussed under John's Committee.

2 CHIEF MCEWEN: I think John's standing
3 right by me, so I will leave it to him. But I would
4 be very concerned that we don't overlook what it is we
5 really need to end up with here. I mean, we've got
6 kind of one opportunity here to do a lot of things
7 that we've never done before.

8 CHAIRMAN NASH: Yes, I agree; we need to
9 come to an appropriate decision as to whether or not
10 wide-band data radios are required to have capability
11 on the interoperability channels, and then we get down
12 to describing what that capability, what that means
13 from a technology standpoint.

14 MR. POWELL: John Powell.

15 I thought that we had clarified that. You
16 said San Francisco. I think --

17 CHAIRMAN NASH: I thought that we had,
18 too.

19 MR. POWELL: Yes, I thought we had
20 included wide-band with that, and we said that if you
21 had wide-band, you didn't have to have narrow-band,
22 and vice versa. But if you had a data radio, wide-

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1 band data radio, it needed to be capable of operating
2 on the wide-band interoperability channels.

3 CHAIRMAN NASH: Yes, it sticks in my mind,
4 then, John, that we need to look that up again, and if
5 it didn't get out as a recommendation to NCC or if NCC
6 didn't make that recommendation to the FCC, then I
7 guess that's where we need to go back and pick it up
8 in Interoperability, wouldn't you say?

9 MR. POWELL: Right.

10 MR. BUCHANAN: Right, we will have to look
11 at the documents and find out.

12 MR. POWELL: Yes. It would certainly
13 sound like consensus of everybody here is that that's
14 the way it needs to be.

15 MR. SCHLIEMAN: John, while you are up
16 there, I think the discussion also has revolved around
17 the issue of the three channel widths for
18 interoperability. I think it is basically a seesaw
19 between how fast the traffic has to get through versus
20 how wide the channel's got to be, versus how much
21 frequency reuse you can get for high population areas
22 like the LA Basin, and so on.

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1 Cost aside, from the technical
2 perspectives, frequency reuse and the time it takes to
3 get a given amount of traffic through seems to be the
4 real issue. Obviously, you can take any application
5 and stick it in wide-band and just get it through
6 faster, which presumably means you get off the channel
7 quicker. So to that extent, you could have a shared
8 channel that would get a lot of use, but there are
9 some implementation issues in that area.

10 Has there been any recommendation for a
11 standard channel width for interoperability? I don't
12 recall that there has been. The way the rules are
13 right now, they can be aggregated from 50 to 150, and
14 I think that's really a root of some of the heartache
15 we are having right now.

16 MR. POWELL: There hasn't been, but I
17 think to a degree it also depends upon the technology
18 that's adopted, because if you use the one proposal it
19 will take the whole channel and just do it faster, if
20 you've got a good signal.

21 Of course, what you have to start looking
22 at then is that you have a ramp-up time and then your

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1 dropoff time, and if you are sending something very
2 minimal, those times at the beginning and end of your
3 signal could far exceed the length of time it takes to
4 put your traffic across.

5 CHAIRMAN NASH: Yes, I guess, John, where
6 I see a division between our two subcommittees is that
7 yours would need to define either the applications
8 that have to be supported or how much data needs to be
9 transmitted how quickly. Then from that, that defines
10 a throughput requirement that my Committee then would
11 have to look at technology to figure out how do we
12 accomplish that throughput requirement, and certainly
13 depending upon what the throughput requirement was, we
14 may be able to say, well, that can be done on a 50
15 kilohertz-wide channel or that requires 150 kilohertz-
16 wide channel. That's going to have to be one of the
17 technology decisions that has to be made, but, you
18 know, we need some definition of what the throughput
19 requirement is on the interoperability modes.

20 MR. POWELL: Well, certainly if we look at
21 the requirements that we examined early on with
22 regards to that what the Chief just called streaming

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1 video, but nearly four-motion video is a requirement,
2 if we look at, for example, monitoring fires from an
3 aerial platform, that's the kind of application we
4 need to support.

5 CHAIRMAN NASH: But is monitoring fires
6 from an aerial platform an interoperability function
7 or is that a general use function?

8 MR. POWELL: I could see that being an
9 interoperability function because they could be
10 feeding that down to units from a number of different
11 organizations.

12 MR. SCHLIEMAN: Is it also not, because of
13 the bandwidth requirement, a 4.9 gigahertz --

14 MR. POWELL: It could be, but we are not
15 there yet.

16 CHAIRMAN NASH: That gets back to what the
17 Chief was saying, you know, that we requested 97.5
18 megahertz, and to try to jam all 97.5 megahertz worth
19 of requirements into this 24, it may not be the best
20 thing to try to do. We may have to be making some
21 choices here about what is appropriate in this 24 and
22 what should be just set aside for future spectrum

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1 allocations as not being appropriate to be
2 accomplished in this 24.

3 MR. BUCHANAN: I think we made those
4 choices. Again, what needs to happen is my work group
5 needs to -- I need to dig those back out, circulate
6 them again. I think some of that we did. Now we may
7 want to revisit it.

8 One of the things we didn't have back at
9 that time is there was even some question whether the
10 technologies would get 384 kilobit through, and now I
11 am seeing that in best case it is almost double that.

12 So we know a little more information now, and we may
13 just need to dig out the old documents, go over them
14 again, and see where we are lacking or what we have
15 covered.

16 MR. POWELL: And with 4.9 on the table
17 now, it may be appropriate to look at what should go
18 in this band and what shouldn't go in this band.

19 MR. BUCHANAN: Yes.

20 MR. POWELL: Especially if we look at what
21 is happening in your region, where you're out of data
22 channels. I mean you're clearly out of data channels.

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1 If we could put applications in that only need 50 or
2 100, you're going to get much better use of the
3 spectrum.

4 MR. BUCHANAN: Yes, and, again, it's
5 interoperability. So I would see it where we need to
6 support maybe some of this video over distances that
7 you can't cover with the 4 gig, which happens on some
8 of the large fires.

9 MR. POWELL: We need to take a look at the
10 parameters.

11 MR. BUCHANAN: Yes. But why don't we just
12 do this: Let me dig out those old documents,
13 recirculate them, and then we will look at all these
14 issues again. Then by next meeting maybe we can have
15 some recommendations for both Interoperability and
16 this Subcommittee.

17 MR. POWELL: Right.

18 CHAIRMAN NASH: Okay. Any other comments?

19 MR. WILHELM: I have a question --

20 CHAIRMAN NASH: Yes, sir.

21 MR. WILHELM: -- for Wayne, if he would,
22 please.

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1 Wayne, in the wide-band standard that is
2 being considered now, are there provisions for such
3 parameters as receiver intermodulation, adjacent
4 channel performance, and other receiver standards?

5 MR. LELAND: No. Well, they would be in
6 the performance end of things, yes.

7 MR. WILHELM: But you would specify a
8 minimum intercept point or a minimum adjacent channel
9 rejection capability?

10 MR. LELAND: Yes.

11 CHAIRMAN NASH: Any other questions?
12 Comments?

13 (No response.)

14 Any other business for this Subcommittee?

15 MR. WILHELM: Glen, it may be a bit
16 repetitious, but if you could go through the items on
17 the memo, if you would like, I could summarize what I
18 have to take to the Steering Committee. Would that be
19 useful?

20 CHAIRMAN NASH: Sure.

21 MR. WILHELM: See if there is anything
22 else. My notes are kind of cryptic, but, as to Charge

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1 No. 1, there is a requirement that we expand the ICS
2 to include such things as police and highway functions
3 in it.

4 Also, and this is an Interoperability
5 Subcommittee charge, but I think I should read it
6 anyway because we discussed it here, and that is the
7 guidance on whether wide-band interoperability is
8 required, and what is the proper interpretation of
9 Section 90.547 of the rules.

10 Parenthetically, I might say that, as
11 someone mentioned earlier, the wide-band rules are
12 kind of a work-in-progress. I think you can expect
13 some changes in them.

14 We also have, under that first charge, the
15 subject brought up by John Powell as to an all-band
16 interoperability rulemaking, and whether that will
17 take the form of a recommendation from the NCC to the
18 FCC or whether another organization will submit it as
19 a petition for rulemaking, I certainly think the NCC
20 would be involved at the Interoperability Subcommittee
21 level and possibly the Implementation Subcommittee
22 level.

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1 Under Task 2, of course, they have wide-
2 band standards. Also, for the Interoperability
3 Subcommittee, the matter of addressing for both high-
4 speed and low-speed applications, and also the
5 definition of standard wide-band applications, the
6 Technology Committee is also concerned about 50
7 kilohertz and 100 kilohertz ACCP and data rate
8 specifications in the rules. If that recommendation
9 has not been made to the FCC, it probably should be.

10 Under Charge 3B --

11 CHAIRMAN NASH: I would add on Charge 2,
12 we will be coming forward with a recommendation
13 regarding encryption or a change to the current rule
14 regarding encryption on the narrow-band channels.

15 MR. WILHELM: That will be primarily a
16 Technology Committee function, correct?

17 CHAIRMAN NASH: Right.

18 MR. BUCHANAN: That's 3A. That's 3A.

19 MR. WILHELM: Is it?

20 MR. BUCHANAN: Yes.

21 MR. WILHELM: Yes, I did have it under 3A.

22 MR. BUCHANAN: Okay.

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1 MR. WILHELM: But that is the only thing I
2 had under 3A.

3 Under 3B, for the Implementation
4 Subcommittee, the finalization of the guidebook for
5 the Regional Planning Committees.

6 As far as Charge 4 is concerned, I have
7 only international issues and DTV band clearing.
8 These are the matters that I propose we take to the
9 Steering Committee tomorrow, and this will be the
10 opportunity to add anything to that list.

11 Is there anyone who has an addition to
12 this list?

13 (No response.)

14 I don't think there are any remaining
15 issues, and I don't mean to preempt Glen, but I think
16 it would be appropriate to adjourn the Technology
17 Subcommittee meeting at this time, unless there's
18 other business.

19 CHAIRMAN NASH: Ernie?

20 MR. HOFMEISTER: When Glen asked if there
21 was other business a few minutes ago, I was going to
22 make a comment. It has to do with encryption, and it

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1 may not be for Technology, but maybe for
2 Interoperability.

3 I would just encourage us to think through
4 this requirement that we talked about of having both
5 AES and DES, triple DES, in these radios. If it a
6 true requirement, so be it. That's the way it comes
7 out. If you are going to put AES -- if you require
8 encryption, you require both of them, and you put DES
9 and triple DES in there, and it never gets used, I
10 mean that is a capability that I think is adding
11 capability, and I think eventually cost and others, to
12 the radio that may not make overall sense.

13 MR. SPEIDEL: Yes, Bob Speidel. I just
14 wanted to make one comment.

15 If anybody is interested, that petition
16 for clarification, or whatever it is that I put in, it
17 was either in last February or last March, it is
18 available in the Commission's electronic comment
19 filing system. If you look under 96-86 and search
20 against "ComNet," one of our prior names, you should
21 find it. I believe it was like last February.

22 But I also want to point out that I think

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1 the petition that I put in only was trying to clarify
2 the narrow-band issue. It did not go to the extent of
3 then saying, oh, please put in a rule saying wide-band
4 must have wide-band capability. Because I didn't know
5 what to then include as the corollary to 548, and that
6 means you must comply with A, B, C, and D. Okay?

7 So if anybody is interested, that is where
8 it is.

9 CHAIRMAN NASH: Okay, any other comments,
10 business for this Committee?

11 (No response.)

12 Seeing none, I will -- I don't know if I
13 can just adjourn it, or we have to vote on that? We
14 can't vote?

15 MR. WILHELM: You can't vote. We will
16 just have to adjourn.

17 CHAIRMAN NASH: Okay, we will adjourn the
18 Technology Subcommittee, and, Michael, I will defer to
19 you as to what you want to do about the Implementation
20 Subcommittee.

21 (Whereupon, the Subcommittee proceedings
22 were concluded at 11:52 a.m.)

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