

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

In Re:)
)
PUBLIC SAFETY NATIONAL)
COORDINATION COMMITTEE)

Commission Meeting Room
Federal Communication
Commission
445 12th Street, S.W.
Washington, D.C. 20554

Thursday,
June 1, 2000

The parties met, pursuant to the notice, at
8:30 a.m.

APPEARANCES:

PANEL:

MICHAEL WILHELM

DAVID BUCHANAN, Acting Chair

ROBERT SCHLIEMAN

GLEN NASH, Chair

RON HARASETH, APCO

DON ASHLEY, First Vice Chair

Heritage Reporting Corporation
(202) 628-4888

APPEARANCES: (Continued)

PARTICIPANTS:

ART MCDOLE, APCO

CARLTON WELLS, State of Florida

DAVID EIERMAN, Motorola

ERNIE HOFMEISTER, Com-Net Ericsson

RICH MURPHY

WAYNE LELAND, Motorola

STU OVERBY, Motorola

STEVE BEEFERMAN, Data Radio

NORM COLTRI, RCC Consultants

TOM SORLEY, Florida Chapter, APCO

KEVIN KEARNS, Washington Chapter, APCO

HARLAN MCEWEN, International Association of
Chiefs of Police

DICK DEMELLO

BOB SPEIDEL, Com-net Ericsson

AL ITTNER

BOB ENSMINGER, State of California

P R O C E E D I N G S

(8:31 a.m.)

MR. NASH: Good morning. Okay, first item on the agenda is the approval of the agenda. Copies of it were in the back. Any comments? Any additions to the agenda?

(No response.)

MR. NASH: Okay. It looks like the agenda --

MR. SCHLIEMAN: Under Work Group 2, I am also looking at the state of the different modes of -- different channel widths. I'm split up into areas. I might just add an eighth, I guess.

MR. NASH: Okay.

MR. SCHLIEMAN: Would it be a fair statement to also advise people that this is being broadcast over the internet, everything that is said at this meeting?

MR. NASH: Okay. I did not include in approval of the minutes the -- the minutes from the last meeting were sent out to everyone. What it was was the plan of action for the coming year, that was sent out to everyone on the web server. If anyone needs a copy of that, I can probably come up with one.

Okay, first item then is going to be the Working Group 3 report on the channel assignment plan. Ron, because I know you are tight on time here so.

MR. HARASETH: Last time we were here we had some discussions, some ex-parte discussions with the FCC about -- that related to the practicality of the placement of some of the blocks within the spectrum that we have been issued. And

what we have been doing is soliciting some information, some input on some other combinations.

Essentially what we're looking for is some method that put the interoperability blocks at 250 kilohertz intervals to facilitate applications for transmitter combiners and whatnot.

And we have got essentially three alternates that I have come up with. I have some photocopies. They didn't come out very well. My color one did good, my black and white printout did good, but my photocopy of my black and white did not do real great. But I have those that can be passed out.

We have three different proposals essentially that we are looking at and all three of those put the channel blocks for interoperability. They maintain two frequencies for 12.5 block at 250 kilohertz intervals, and --

MR. NASH: All the same?

MR. HARASETH: Yeah, they are all the same.

MR. NASH: Okay.

MR. HARASETH: Carlton Wells has one plan that he proposed, one that I kind of had been working is very similar and some of the things we were trying to do is keep guard bands around them and there is an NPSTC-Ericsson band plan that was proposed earlier on that takes that one other step and shifts the 12.5 kilohertz interoperability blocks by six and a quarter, so that the centers are in between. And it has one guard band from the reserve blocks on each side of each 12.5 for a six and a quarter guard band.

It also strings out -- that particular one also strings out the reserve channels in a contiguous frequency block pretty much. As indicated, it's the -- I'll wait till everybody gets those and just kind of -- you can kind of pencil in some of this.

The NPSTC plan, Ericsson plan, the third one down, the channel is 401 all the way through 480 are all reserve channel frequencies. There is also a reserve channel block adjacent to each one of the interoperability ones, which you can see, so that you essentially have a 25 kilohertz blocks spaced equa distant throughout that band at 125 kilohertz intervals so that you can have pairs at 250 kilohertz intervals.

That one is probably the symmetrical of all those. However, it does play with the general -- with the actual count of the reserve frequencies. I'm not sure if that will be a problem or not.

The other one, Carlton's rendition there, a little bit more difficult, but essentially the block starting with 13 and 14, all the way down horizontally were all reserve channels. All the channels in between 16 and 23, that whole block vertically and horizontally are all reserve channels. And to the -- immediate below the 23 - 24, 183, 184 block is also reserved channels.

Moving over to the right-hand side, let's see, both vertical columns 53 and 54 are all reserve channels, and everything in between from 57 through 62 are all reserve channels throughout, and again 65 through 68 are all reserve channel and everything below all of the public safety channels or the interoperability channels are also reserved.

So in effect what you have is you have guard channels on either side of all of those except for the 23 - 24 block over there, which has general use channels next to it.

The top one is very, very similar to Carlton's although they are spaced a little bit differently, and the rows 13 and 14, all the way down are reserve channels. Seventeen and 18 vertically are reserve channels, and 21 through 24 are reserve channels.

Moving over to the right, 53 - 54 are reserve channels, 58 - 58 are reserve channels, and 61 all the way through 70 -- 68 are all reserve channels.

About really the big difference between that proposal and Carlton's proposal is that there are a guard band in the one proposal for that one block. The big difference with the Ericsson-NPSTC plan is that they have shifted the centers of the 12.5 blocks for interoperability by six and a quarter and use just one six and a quarter reserve channel for a guard band. And there is pluses and minutes for any one of those.

And we were having some discussions just before that we could probably address that same situation and that request that Ericsson had by shifting either one of these other plans by six and a quarter and do something very similar.

But anyway, we will open that up for discussion. Art?

MR. NASH: Art, will you please use the microphone?

MR. MCDOLE: As we are all well aware in the original -- oh, I'm Art McDole representing APCO. In the original NPSTC rules, they provided for guard bands on each side of the interop channels.

One of our concerns has been all the way through that in the original release of this that it would be up to the regional planning committees to use those guard bands or else the efficiency of the interop channels would be destroyed.

I see that you have mostly addressed that in some of these plans. I encourage us to pursue that. Really the guard channels are necessary with any state of

the art. If we are going to have people moving from one area into another area, and that area might be using those guard channels with high power, which were not really guard channels, we really have a problem.

So I think that needs to be addressed and I applaud you for what you are doing. I have looked at all these plans and I am not totally in my mind satisfied as which is the best, but I encourage you to watch the guard channels as you go ahead with this.

The spacing, obviously, is desirable but in a way you lose. In other words, if you space the air-up channels two channels apart, you have provided a guard channel for each one by that very fact and becomes a little more spectrum efficient. When you spread them out, then you've got to double the number of guard channels. So it's something to think about as you go through.

MR. HARASETH: I guess that's one of the questions I have, is if we were to modify those one way or the other would it be advisable if we try to stick with just a six and a quarter guard band or if we want to do a full 12.5 guard band, and how that would affect local use.

I can see that the regional planning committees could probably very well implement some for of operation in those adjacent channels under low-power basis.

And is it more, is it more efficient to keep that a six and a quarter or a 12.5 as far as spectrum efficiency?

MR. MCDOLE: The state of the art -- as we anticipate this new equipment, of course, I defer to the manufactures, it would appear that a six and a quarter guard band on this new spectrum might be advisable, certainly become more spectrum efficient if we can get by with a six and a quarter, and particularly where you space the

interop channels to six and a quarters apart, you have in essence gained, might unseen have problems with using the interop channels that were adjacent with only 12.5 between the two.

But conversely, overall you would have a lot more flexibility it would seem and to get better spectrum efficiency. Just one person's opinion.

MR. HARASETH: Ron.

MR. SCHLIEMAN: In Wells' proposed plan of May 3rd, the spacing between the channels is probably better for coordination purposes, to avoid adjacent channel problems.

Also, we have some interoperable trunking channels that fill up the holes.

I was just going to look in the interoperability report to confirm the channel numbers, but essentially where have two slots next to those channels that aren't shown as having anything here, they do become active in the event of a TDMA trucking application which is allowed under the recommendations that we have put forth from NCC to the Commission on February 25th.

So we need to keep in mind that we've already recommended that we have some four-channel -- for six and a quarter kilohertz channel blocks that have to be looked at in that context.

MR. BUCHANAN: Ron, Dave Buchanan.

Actually I think Carlton's plan, if we just shifted six and a quarter to the left on that, would essentially do what the NPSTC-Ericsson plan does, plus it's a better -- I think it's a better layout for the reserve channels than stringing them all the way across on the bottom. I think it's going to be harder to coordinate, harder to lay out a plan for

those channels when we -- whoever ends up planning them, whether it's the regional or the state.

That would also let you use them where we designated them for the trunking. You could either trunk them as 12.5 kilohertz or you could trunk them as 25 kilohertz, or six and a quarter, for that matter. So I kind of favor just making that shift and then going with Carlton's plan.

MR. HARASETH: Okay. So essentially we would have minimum at least on two sides of -- well, on three sides actually of six and a quarter guard bands.

MR. BUCHANAN: Right. Yeah.

MR. HARASETH: Okay. One thing I wanted to note here also on the NPSTC-Ericsson plan down here, 338 and 339 are identified as secondary narrow band data in the previous action that we've had, and I think those are what, Carlton, the data TAC channels that are in the --

MR. WELLS: Yes. I believe -- Carlton Wells, State of Florida.

Yes, I believe if you look on the list of channel designations they are listed as DTAC-21 and DTAC-51. I'm recalling those numbers off the top of my head, but there were two identified from a recommendation that I believe it was in Dave Buchanan's write-up from the January meeting, User Needs Statement of Requirements write-up.

Ron, if I may add a couple of other pieces of information here. In the alternate proposed plan of 5-11-2000, that one gives you the extra reserve space on the right side of the first two blocks of interoperability. However, it gives you only 12.5 on the left side of that same block.

Looking at the Wells' proposed plan of 5-3-2000, not only does it have the 12.5 kilohertz block on the left side, there is no reserve spectrum on the right side. By shifting everything over six and a quarter, there is some uniformity of six and a quarter spacing on each side from your general use channels. In the alternate of 5-11, you get six and a quarter spacing on one side of each -- of guard band, but then you have six and a quarter plus an additional reserve spectrum to the general use.

With the inconsistencies of spacing, would that cause any problems between the two as far as protection from general use or not?

MR. HARASETH: I don't think in either case that probably would make too much difference. You have a continuous block of 25 kilohertz whether it be reserve or whether it be general use that would be on the right-hand side, and I don't know if that would be a consideration one way or the other. I think either one of those should be shifted six and a quarter though.

MR. WELLS: Oh, yes. Not arguing the six and a quarter; just showing the differences between the 25 kilohertz versus six and a quarter kilohertz spacing. One gives you an extra -- gives you 25 plus six and a quarter whereas the second proposal gives you merely six and a quarter between the reserve or between the interoperability and the general use.

And now the second issue, going to the NPSTC and Ericsson band plan, that string of reserve channels across the bottom, what application or how will those be efficiently utilized by a state, by a region?

We have narrow band channels and wideband channels, and I was kind of joking around before the meeting started and I'll just throw the joke out here or just a wild

hair-brained idea. Is there an opportunity for a 750 kilohertz ultra-wideband channel out of that?

MR. HARASETH: I suppose technically you could stretch that even farther and say that people could license those as contiguous TDMA 25 kilohertz block channels, but implement those into some futuristic scheme where you could use all of those blocks if you had them contiguous. There is a lot of different techniques that could use that that really aren't being used right now. So there may be some advantage to actually having that contiguous 750 kilohertz block there.

MR. WELLS: Since I have no definite ideas on how that would be utilized efficiently, I bring it back to the first two band plans that we are talking about for possibilities.

MR. HARASETH: So we have got a few things resolved but there is a few other things we probably need to go back to the drafting board on. Is that what I am hearing maybe?

MR. WELLS: Maybe specifically on the reserve string of channels in the NPSTC proposal. Other than that I believe the various plans are somewhat consistent once we make the six and a quarter kilohertz shift.

MR. SCHLIEMAN: Ron, Robert Schlieman.

Could you explain the advantage to the six and a quarter offset?

MR. HARASETH: Probably just -- if we're going to use these as a guard band, then the advantage would be that you are only using six and a quarter as a guard band, and not spoiling a complete 12.5 pair, you might say.

Is that enough explanation? That's all I can think of. I'm not the original drafter of that so I'm not sure what the original plans are.

Dave, do you have any insight on that?

MR. EIERTMAN: David Eierman, Motorola.

Two things. One is, you know, the adjacent six and a quarter -- you know, we don't have an emissions mask in this band. The emissions are based on the amount of power coupled into adjacent six and a quarter channels or six and a quarter bandwidth, so you are only down 40 dB into the adjacent six and a quarter and then it's like 60 or more dB once you get past that.

So any frequency planning, you know, your adjacent six and a quarter is your critical channel to plan against.

And you know, if you will go back to the original plan, the band is sort of laid out in 25 kilohertz blocks, and the I/O channels were placed in the upper half of the block such that you sort of have some guard on the lower half and, you know, there was like either a general use or reserve channel could be used for something else on the upper half.

And Ericsson, after we had the ex-parte, Ericsson had expressed some concern about, you know, you know, it's hard to coordinate against the upper half. So, you know, Ernie Hofmeister had mentioned that, you know, if we shifted it over to the center, you had a guard band on both sides for the I/Os.

MR. HARASETH: And six and a quarter is sufficient without wasting a full 12.5 essentially?

MR. EIERTMAN: Yes. I mean, you know, if -- yes.

MR. HARASETH: Okay. Does that answer you, Bob?

MR. SCHLIEMAN: Yes. And then in light of the trunking recommendation, what would the -- what would the plan then be to take the six and a quarter on either side to fill it out to 25?

MR. HARASETH: I would assume so.

MR. BUCHANAN: Dave Buchanan.

That's what I had in mind if we shift. You would lend up -- the only thing that you would that -- that would happen then, I think, if you were trying to lay out a plan once you shifted those and assuming someone wanted 25 kilohertz trunking and whichever ones end up being designated as the secondary one, you're going to have to geographically -- on a geographic basis play around with the assignments for that because you're going to end up with your six and a quarter coming out of the adjacent 25 kilohertz blocks is the best way I can explain it.

So I think no matter which way you go at some point, once you have decided that you want to use them as a 25 kilohertz block, then you're going to end up with some geographic spacing to worry about when you're laying out our assignment plans, but I don't see any way to get around that.

MR. WELLS: Carlton Wells, State of Florida.

MR. HARASETH: I hate to interrupt here but I'm going to have to run upstairs to a meeting, and I'll let you guys fill me in on how the conversation goes here. Thank you.

MR. WELLS: Regarding the trunking use of the interoperability channels, we have already arrived at a consensus to have secondary operation. If you go to the

original band plan at the bottom, the first set of one, two, three, four five interoperability channels can be expanded to include the left 12.5 kilohertz channel set to make a 25 kilohertz wide truck channel so that are consistent with the general use frequencies.

Move up to the other band plans, if you take -- well, let's go to the NPSTC-Ericsson band plan first, the third set of interoperability channels, that would be the likely spot to expand the 25 kilohertz wide for secondary trunk operation.

Moving up to the other band plans, it could be generally the same one vertically or the first set of five over to the left of those band plans. Again by expanding them to 25 kilohertz wide operation, you still have your adjacent channel of general use to the left of it, and then you've still got the protection of reserve or guard band to the right of it. So I don't think we have lost anything with any of these plan changes; that secondary trunking, I think, would still be able to take place.

And I think regardless of which band plan we go with the biggest change to any of the interoperability policies that have been -- we have reached consensus on thus far is the channel numbering. We just merely renumber those channels for consistent use, but just to get the numbers back aligned again.

MR. BUCHANAN: Dave Buchanan.

Based on that too, I don't -- these two that they have in NPSTC is designated as secondary, or the data channels should move over to another pair actually so that you don't mess them up for the secondary trunking, so you could keep a continuous block for trunking and have a second pair, I would think, for the data if that's what's going to -- unfortunately, I don't remember off the top of my head what we ended

up with on the data, but I guess it was as you were saying, Carlton, a pair of channels that could be used for, what was it, simplex mobile data or was it mobile data period?

MR. WELLS: There were two data channels, and I can pull it up out of my files, but DTAC-21 and DTAC-51, let's use those two numbers anyway, that means there are two 12.5 kilohertz data channels.

In the upper portion of the 700 megahertz narrow band and then the lower portion of the 700 megahertz narrow band, talking about just once out of the repeater pair right now.

In the NPSTC-Ericsson plan it only shows one 12.5 kilohertz channel set for data. And given that DTAC-21 and DTAC-51 mentioned, there should be another data channel in here somewhere.

MR. BUCHANAN: Yes, that's kind of what I thought too. So anyway, I think if we ended up with going with the NPSTC plan we would need to do something with those -- we would need to shift that over and fix the data so it's back to what we had recommended.

MR. WELLS: Something else come to mind too with how we broke up the interoperability channels for call it ETAC, FTAC, LTAC, GTAC and OTAC, and then we got the DTAC. It may get a little tricky on how to spread the alphabet soup around across the different layouts for the interoperability channels.

Recall that those TAC channels were in groups of five, five and then six, and we came up with the OTAC for the sixth channel, I believe, and later I believe we changed that to DTAC.

But anyway, in the new band plans proposed, we have a group of five, three, five and three at the top. Similarly, for the second row, but then we have a four, three, five, three. So we've got an inconsistent vertical layout in the NPSTC-Ericsson band plan, and so that may make it a little tricky on how the TAC channels are alphabetized.

MR. NASH: All right. Can we try to home in on a specific recommendation?

MR. BUCHANAN: Well, this is Dave Buchanan again.

I would still recommend going with the Wells plan and shifting it by 12.5 kilohertz, and then let us just look at renumbering or relabeling to make it consistent with the original plan for the interoperability designations.

MR. NASH: Okay. So you're recommending the Wells plan, or you know, the second one, second block down?

MR. BUCHANAN: Right.

MR. NASH: And when you say shift it 12.5 --

MR. BUCHANAN: I mean, shift it six and a quarter to the left.

MR. NASH: Okay. Shift. So the 15 - 16 block becomes 14 - 15?

MR. BUCHANAN: Right. Twenty-two - 23 would be the new block down, 54 - 55, and then 62 - 63.

MR. NASH: Okay, so it would be 14 - 15, 22 - 23?

MR. BUCHANAN: Yes.

MR. NASH: Fifty-four - 55.

MR. BUCHANAN: Right.

MR. NASH: Sixty-two - 63.

And then would that -- the 24 would become a reserve?

MR. BUCHANAN: I'm sorry, the?

MR. NASH: The 24 line.

MR. BUCHANAN: Yes. It's hard to read on here. I guess that's part of the reserve without the color.

MR. NASH: Yeah.

MR. BUCHANAN: If it's part of the reserve, then it would be part of the -
- it would become a reserve. It would either be --

MR. MCDOLE: Art McDole.

A little clarification on your suggestion. If we were to move that one to the left, what happens to the guard bands on either side? Are we going to do a six and a quarter guard on either side of everything then, and so we have, in essence, we've gained nothing, as opposed to the original plan the one above, for example, where you have spaced and left two six and a quarters in between. You have an automatic guard band when you do that as opposed to creating new guard bands on either side of all channels.

MR. BUCHANAN: Well, you do but you lose it either way. Then you -- if you stay with where they are at, you know, one side is okay.

Well, take up above or just the way it is now where you've got 17 and 18 would be guard bands, which is fine, that doesn't mess anything up, but then you're also taking 21, which would mess up that block of four for use in a 25 kilohertz.

MR. MCDOLE: I agree. But on the other you used the word "mess up," you're messing up something on every side of every channel.

MR. BUCHANAN: Well, you are but you're keeping it within a 25 kilohertz block, so at some point you lose some place.

MR. MCDOLE: Yeah.

MR. BUCHANAN: And it just seems like you lose -- not that everything is going to go 25 kilohertz, but if you look at just narrow band mobile data uses or anyone that wanted to implement a TETRA type system where you needed 25 kilohertz blocks, then you have really got a problem. You won't be able to use that one block, say 21, 22, 23 and 24, you would end up losing -- actually you would end up losing 12.5 out of there instead of six and a quarter because you still need some guard bands if you have a six and a quarter system.

MR. MCDOLE: Right.

MR. BUCHANAN: So I think by shifting it you lose fewer than if you leave it the way it is.

MR. MCDOLE: It's just a lose-lose situation when we provide a guard band. If you put in 25 kilohertz system, then you've got a guard on either side of that also.

MR. BUCHANAN: Yes, and I'm assuming, and Dave can correct me if I'm wrong, but I'm assuming even with the 25 kilohertz all you need is the six and a quarter guard band. So, yeah, Dave Eierman is shaking his head yes.

MR. EIERMAN: Yeah.

MR. BUCHANAN: So I think by shifting it you mess up less than if you leave it the way it is.

MR. NASH: Okay. So if I understand the recommendation then is that reading across the 13 column becomes -- stays a reserve, which is essentially as a guard band?

MR. BUCHANAN: Right.

MR. NASH: Fourteen and 15 are the interop channels. Sixteen is a reserved, is essentially is a guard band. Seventeen, 18, 19, 20 are reserved and work out to be a nice four channel --

MR. NASH: -- 25 kilohertz wide set.

MR. BUCHANAN: Yes.

MR. NASH: Twenty-one is a reserved and amounts to being a guard band. Twenty-two and 23 are the interop channels, and then 24 is a reserved and again is a guard band.

And the same thing happens over in the right-hand block.

MR. BUCHANAN: Right. And you leave 25, 26, 27 as a block, 25 kilohertz block that could be used in the same geographic area.

MR. SCHLIEMAN: Could --

MR. NASH: Now, 25, 26, 27 --

MR. BUCHANAN: I think that's general use.

MR. NASH: Are general use channels.

MR. BUCHANAN: Right. But I'm saying it could -- it could be put together as a block of 25 kilohertz in the same geographical area that you're using the interoperability 23 and 24.

MR. NASH: All right. All right.

MR. MCDOLE: Just a question, if I may.

You're speaking of the 25 kilohertz channel for a TETRA type system.

We totally agree. But it's my understanding that if we go into the direct unit-to-unit mode that the TETRA proposal for unit to unit outside the infrastructure would be then a 12.5 kilohertz operation, a 25 phased one, or is it still going to take 25 kilohertz unit to unit.

How will it interop with other systems in that mode and we -- we can't coordinate around it. In other words, you don't know where those units would go on a situation. In their own area there is no problem of coordinating, but if they move into another area and if they are going to use 25 kilohertz --

MR. BUCHANAN: Well, if they are going to go on interoperability, they have to go to the 12.5.

MR. MCDOLE: Twelve and a half.

MR. BUCHANAN: If not, then they can -- they would stay within their own block --

MR. MCDOLE: That's my understanding.

MR. BUCHANAN: -- as 25 kilohertz, if I understand TETRA right.

MR. MCDOLE: Is there anyone here to verify that would be the case?

MR. SCHLIEMAN: Art, this is Robert Schlieman.

I think as far as the interoperability mode is concerned, it is the ANCI 102 12.5 kilohertz.

MR. MCDOLE: Okay.

MR. SCHLIEMAN: That's what they agreed to.

MR. MCDOLE: That's what I thought.

MR. SCHLIEMAN: I think what you are perhaps doing is mixing up their direct mode operation and their trunking operation, which is on 25 kilohertz single frequency and 25 kilohertz two frequency channel operation with the interop issue.

MR. MCDOLE: Yeah. No, no problem with the coordinator around a particular geographical area with the 25 kilohertz. It's just that they would revert back to the 12.5 as they roamed into another area, and so they wouldn't have the, the guard band would suffice.

MR. SCHLIEMAN: Glen, I wanted to ask one question. Is it your intention then that we recommend the six and a quarter guard be reserved across the band -- across the country, or subject to regional planning reserve as a guard band?

I think in the -- at least early thoughts on this thing we had anticipated that in some areas the lower set of interop channels would be used, and in adjacent areas the upper set would be used to avoid mutual interference between areas. And if that's the case, then it wouldn't be necessary to reserve a guard channel when the regional planning committee had determined their particular needs for interop.

MR. NASH: I have no specific preconceptions. You know, if -- you know, whatever, you know, the consensus of the group is as to how we should be using these channels and --

MR. SCHLIEMAN: Well, since you've mentioned it as a guard band, I just wanted to have perhaps some discussion on that. But it seemed to me that there was a desirability of alternating the sets of I/O channels from one area to another to avoid interference.

MR. BUCHANAN: Well, the way we've shifted it you actually wouldn't have to do that. You could really use all of these in the same area if you --

MR. SCHLIEMAN: Oh, yes, you could. I wasn't -- I wasn't locking that option out. I was merely suggesting that if we are going to designate a channel as a guard channel and thereby prevent its being used by a regional planning committee for regular operations.

MR. BUCHANAN: I would --

MR. NASH: Then what you're really saying, Bob, is that -- is perhaps the rule should be written to the effect, you know, that in any area, you know, the adjacent reserved channel becomes a guard band in any area in which the interop channel is used.

MR. SCHLIEMAN: According to the original plan, yes. In other words, it would be subject to regional plan.

MR. NASH: Mm-hmm.

MR. SCHLIEMAN: Yeah, I wouldn't want to make it where the interop channels are to -- assigned in the original plan to a particular area.

MR. BUCHANAN: Yeah, I could agree with that. I just wouldn't want to see it as the hard and fast guard band so that you couldn't -- you couldn't make use of it some way if the interoperability channels weren't used in an area.

MR. SCHLIEMAN: Right.

MR. BUCHANAN: There needs to be some flexibility there.

MR. SCHLIEMAN: But it should be subject to --

MR. BUCHANAN: You also need the protection too.

MR. SCHLIEMAN: Yes. But subject to regional planning.

MR. BUCHANAN: Right, subject to regional planning.

MR. NASH: Okay. Any 'other comments? Are we approaching being able to say we have reached consensus on what the -- on a recommendation for a band plan?

MR. BUCHANAN: Glen, I just have a question. Is there anybody from Ericsson or NPSTC since we've changed some of their stuff? Is there any comments? Are they happy with this, or going to be upset with it?

MR. HOFMEISTER: Ernie Hofmeister from Ericsson.

No, I think we're fine. The biggest concern that I think we had I think you have already addressed; to sort of move the interop channels into the center section of the group of four 25 so you have the guards and still preserve the four channel options.

MR. NASH: Any other comments?

(No response.)

MR. NASH: I'm not sensing a whole lot of enthusiasm or negativity about anything here.

MR. SCHLIEMAN: It's early.

MR. NASH: Haven't had our coffee yet.

Okay, I'm going to step out here and say we -- you know, unless I hear negative comments, we have reached consensus on the modification to what is listed there as the Wells plan of 5-3-2999.

MR. SCHLIEMAN: Offset by one channel.

MR. NASH: Offset with --

MR. SCHLIEMAN: One channel to the left.

MR. NASH: Right, with the interop channels offset one channel to the left.

Any opposition to my declaration of having reached consensus?

(No response.)

MR. NASH: All right, we've reached consensus by declaration of the Chair.

Okay, Carlton, do we -- would it be advisable for us to go through and try to put specific alphabet soup names on these so that we are sure we have covered all of the alphabet soup that comes out of the interoperability committee?

MR. WELLS: What I'll do before the interoperability subcommittee meets this afternoon is run through the alphabet soup with this band plan and see how it plays out and bring it up this afternoon.

MR. NASH: Okay.

MR. WELLS: And also, I think you didn't stick your neck out. I believe the slant was toward the Wells plan, not that I am Carlton Wells, but it was toward the Wells plan.

MR. NASH: All right, so you will bring up that report then at the -- you know, to make sure we're covered. Okay.

All right, moving on, Working Group 2 report on encryption standards.

MR. SCHLIEMAN: This will be put out on the web, but I will read the document that I have here.

As a result of comments made by Steve Beeferman, Data Radio, Technology Work Group No. 2 was tasked at the April 6, 2000, meeting in Washington, D.C. with reviewing software defined radio technology.

The Federal Communications Commission has opened a notice of inquiry into software defined radios, ET Docket 00-47 --

MR. NASH: We're supposed to be on encryption, not software defined radios.

MR. SCHLIEMAN: Oh, I'm sorry. Let's get the right item on the agenda in front of me here.

Regarding encryption, there has basically been no forward motion on the part of the federal agencies that are in control of encryption, so there is nothing new to report on that. This activity is basically occurring in the TR-8 meetings, and we're hopeful that -- good morning. Why don't you pick that up.

MR. MURPHY: I'll tell you what, we'll carry it from there at least to let you know what's happened because there has been a recent meeting of the INFOSEC group at the federal level, and a couple of things have come out of it with a couple of caveats in there as well.

One of the recommended adoptions is going to be the two key triple DES to be recommended as the standard for federal government right now. However, the caveat there is the reality is that advanced encryption standards, the AES, will probably be ready long before equipment is ready at triple DES, and the manufacturers are welcome to speak on that if they feel different.

And with that in mind, although the two key triple DES is the recommended standard to go for interoperability, we realize that we'll be moving on to advanced encryption standard probably before equipment is available in triple DES.

With that in mind, what the committee may want to consider is looking at that at the near future, probably in the September meeting, because one of the things that came out of the INFOSEC group federal meeting was that the 126 bit algorithm was adopted for AES.

So with that, knowing where we are heading, the direction we are headed in, and knowing that it's a software feature eventually in most digital radios, at least that's the way the manufacture community seems to be moving, then you may want to consider that while adopting the two key triple DES as a standard interoperability with the understanding that eventually that's going to move to the 126 bit AES, advance encryption standard, and of course those will be part of the FIPS documents that have been quoted in the past by the technology subcommittee.

MR. SCHLIEMAN: Question for you. Robert Schlieman.

The triple DES has certain variables to it that have not yet been defined in the standards associated with ANSI 102. Is there any kind of a time line when that might occur?

MR. MURPHY: It's scheduled to be taken up in Dallas on the week of June 13th, so at that point the time line may become more clear as to what is going to happen.

MR. SCHLIEMAN: Okay, cause at the last report, I think it was in January, the indication was that this was perhaps a year -- a year or more out before it achieved standard status as far as the TR-8 committee was concerned.

MR. MURPHY: Yeah, it's our impression, and our being the INFOSEC group, that that is not necessarily the case at this point in time. It may be closer than that. But like I said, that determination will probably be a little more clear at the -- I think it's the June 15th meeting in Dallas, TIA meeting.

MR. SCHLIEMAN: Okay. And at the present time the DES standard was, I believe, recommended from this committee, and that is currently in ANSI 102, right?

MR. MURPHY: That's correct.

MR. NASH: And triple DES is backward compatible to that, correct?

MR. MURPHY: That's true. One of the things to keep in mind, I think, if I remember correctly, that the 102 standard DES is also being looked at to be revised.

MR. WILHELM: How does that relate to FIP-63?

MR. MURPHY: FIPS 46-2.

MR. SCHLIEMAN: Well, I'm not an expert on 46-3, maybe Rick is.

The problem that I feel is that we're dealing with a moving target here and the Commission is looking for us to nail it down, and I'm in a bit of a quandary as to how to approach this thing at this point other than to say that it will be resolved in a year or less, but that may not be consistent with the Commission's goals for this committee.

So would you have any words of wisdom on that?

MR. MURPHY: No wisdom this morning. I'm sorry about that.

MR. NASH: Well, I would point out, you know, that an encryption standard, if we adopt one, was based on, you know, the recommendation of the interoperability committee that we have an encryption standard essentially, if you will, as a standard option. That is, encryption was not required on every channel and interoperability, and not necessarily in every radio. However, if encryption was used, it was to be done in a standardized manner.

MR. SCHLIEMAN: Every channel is an option except the calling channel where it was not to be used at all?

MR. NASH: Right. And so it becomes something -- I'm not sure that the Commission would be adopting that as part of a rulemaking. It probably would be more in the form of a -- you know, the recommendation of the NCC as to, you know, what the standardized mode be if encryption was to occur in the interoperability mode.

You know, Bob is right. It does seem like we have a moving target here and I think at some point we need to just draw a line in the sand and say this is -- this is the way the technology is, this is what the standard is going to be, you know, for this quote/unquote option mode until some time in the future which something better makes itself evident and everybody agrees to start transitioning to that something better.

So I'm going to put you on the spot, Rick. Can we at the September meeting draw that line in the sand and say this is it?

MR. MURPHY: I'm going to take my best guesstimate and I think that it's possible to draw a line in the sand in September knowing that the discussions are going on pretty intensely not only this past week, but coming up at the meetings in Dallas, and I

think things will become clearer and at least be able to determine where that line in the sand needs to be.

Also, just to reiterate, I was corrected. It's the 128 bit algorithm, not the 126 as I misquoted on the AES encryption.

But yeah, a lot -- the bottom line is I think the line in the sand will become a little more determinate in the September meeting.

MR. NASH: Okay. Let me pose the question to -- I see at least two of the manufacturers sitting out there.

Will a decision on this issue in September have a significant impact on your ability to design and, you know, the development of your product line?

MR. LELAND: There is a lot of information still --

MR. NASH: Could you try the microphone?

Thank you, Wayne.

MR. LELAND: Wayne Leland from Motorola.

Why don't you rephrase the question for me or say it again?

MR. NASH: Would a delay until September to decide as to what the encryption standard is cause a significant delay in your ability to develop product for this band?

MR. LELAND: No, it would not because frankly we're not working on a product for this band until the FCC finally makes rules. So I mean, if we were happily surprised and the FCC came out and made the rules effective before that time, maybe, but I don't think that's the big issue. I don't think the encryption is a big part of the issue here.

A bigger part is whether the interoperability channels are going to be six and a quarter or 12.5 or whatever they are going to be.

MR. NASH: Okay.

MR. HOFMEISTER: Ernie Hofmeister, Com-net Ericsson.

I think that Com-net Ericsson basically agrees with that; that the delay of three months or whatever is not a factor in our development plans. I think we are on record, like Wayne said, that we really will not develop product until the FCC rules are finalized.

This morning we were just talking about the channel plan, which makes a difference. There is still debate about, I thought, at least a few months, about the transmit/receive, which parts of the band are used for transmit and receive or the base stations and portables and mobiles. All that to us means that, you know, we really -- it doesn't make sense to start any serious development until those rules are known or finalized.

MR. NASH: All right. Still no comment from Michael?

MR. WILHELM: None, none.

MR. NASH: Okay.

MR. SCHLIEMAN: No, he said wisdom.

MR. WILHELM: Now it's no comment too.

MR. NASH: All right. We will put off making a -- arrive at a consensus decision until the September meeting. I would caution everyone that that's probably going to be the limit of my going to put this off. So September I would like to draw the

line in the sand and make a decision as to what the recommendation is going to be on an encryption standard.

MR. SCHLIEMAN: The advantage to a line in the sand is you can always change it easily.

MR. NASH: I'm going to add a little concrete to my sand and set it up.

MR. SCHLIEMAN: Oh, and some water, I presume.

MR. NASH: All right, next item on the agenda is also going to be relatively short here is on receiver standards.

Don Pfohl could not be here today. He sent me a draft proposal in an e-mail, and unfortunately I wasn't able to get it printed out for everyone, so let me just go over it here, and this also is going to end up in -- have to be put off until September.

The proposed recommendations he has here is that the FCC adopt rules which require receiver standards as follows:

One, they be applicable on the interoperability and general use channels, so that is, that they be applicable throughout the band.

Specific recommendations are: taking a look at the ANSI TIA-EIA 102.CAAB, which is the digital C4-FM, CQPSK transceiver; performance recommendation; a specific set of sections, specifically 3.1.4, which is receiver sensitivity, 3.1.5, which is faded reference sensitivity, 3.1.7, which is adjacent channel rejection, 3.1.9, which is spurious response rejection, 3.1.10, which is intermodulation rejection, 3.1.13, which is residual audio noise ratio, and 3.1.14, which is average radiation sensitivity.

What I will do is I'll put this recommendation up on the list server so that everyone can look at those specific numbers and go look at the reference document so that, again, in September we can make a specific recommendation.

Don goes on to recommend that within these sections there are Class A and Class B specifications referenced. His recommendation is that the Class A specifications, which are the tighter numbers, apply to all MSAs, of which there are 306 across the country, including the New England County metro area, and the Gulf of Mexico service area, which includes the water areas of the Gulf of Mexico.

And that the Class B specifications then apply to the RSAs, the rural service areas that have been defined, and there is 428 of them.

Don goes on to make a comment here that although this does not address transmitter standards, recommendation that one transmitter-related issue should be addressed, and that is that the FCC should be encouraged to require that irrespective of channel bandwidth of any two adjacent channel systems, the same protection against interference should apply.

He says there should not be a need for a different geographic separation between adjacent channel systems based upon the channel bandwidths used by two adjacent systems; and that the transfer envelope should be maintained at a consistent level at the channel edges in order to maximize spectrum utilization.

That would seem -- you know, put a real burden on the wider area or the wider bandwidth systems because they are effectively going to have roll off much faster relative to their own bandwidths, so I would entertain comments on that.

MR. SCHLIEMAN: I would offer a comment then. Robert Schlieman.

It seems to me that the filings that have been done on the adjacent channel coupled power issues indicate that with respect to the wider channels, that's not going to happen as he suggests in here; and that that really is a regional planning issue, in my view.

MR. SCHLIEMAN: Any other comments?

(No response.)

MR. NASH: You know, I would tend to agree. You know, it certainly seems, you know, to say that the energy coupled from an adjacent six and a quarter kilohertz wide radio be the same as the energy coupled from an adjacent 25 kilohertz radio is not going to be obtainable. It just doesn't seem practical to me.

It certainly would put a burden on the regional planning process that if you're going to allow wider channels, that you're going to have to consider the impact on the adjacencies. You know, what goes next to each other in the band plan is going to be a real problem for the regional planning committees.

MR. BUCHANAN: Glen, all that discussion just triggered something to me. If I remember right on the way the rules are written right now, if you want to make a 12.5 kilohertz channel, I think it has to be specific channels like one and two, or three and four, which means that to give any kind of guard band when you are trying to lay it out, you're going to have to give up a full 12.5 kilohertz.

I don't know whether maybe we need to also look at in this band plan recommendations changing that to give more flexibility to the regional plans. It may be that it doesn't really matter, that you end up losing the same amount of spectrum either

way, but it's something maybe we ought to look into a little bit more based on those comments on what it does take on either side to form the 25 kilohertz channels.

And then I also had a question. Is this issue of receiver standards something that also holds up the manufacturers -- I assume it is -- from developing product so that, again that you are concrete line in the sand really needs to be September to keep that process moving?

MR. SCHLIEMAN: A question. The band plan is set up on six and a quarter kilohertz channels. You were indicating that it wiped out a 12.5.

Could you explain how that happens?

MR. BUCHANAN: Well, I'm saying that if -- let's say agency A comes in and says I want to put in a system that uses a 12.5 kilohertz wide channel, which is legal under the rules, but if I remember right you have to make that as like channels one and two would be the 12.5, and then the next 12.5 would be three and four, and so on. That may not be the most efficient way to put together 12.5 kilohertz channels knowing that you have to have a guard band anyway.

It may be that you need to -- you need to shift that over six and a quarter to get at more usable channels in a geographic area when you start laying out your regional plan.

MR. SCHLIEMAN: I guess if --

MR. BUCHANAN: I'm not sure on that, but it just seems like something that we ought to look at maybe.

MR. SCHLIEMAN: If the -- I'm going Michael Wilhelm's issue here because I know he is chomping at the bit about six and a quarter. I've heard him.

But the plan is based on six and a quarter as the bottom line channel width. If you accept that premise that six and a quarter will eventually come out and be manufactured and be accepted in the general use channels, and I won't take any issue on that, but if you accept that premise, then the plan as it is allows for best use of the spectrum. Would you agree with that?

However, if it's 12.5 is the actual --

MR. BUCHANAN: Well, if it starts 12.5, as I understand it, the manufacturers aren't far enough down in all the things they need to develop to come out with a six and a quarter. Some manufacturers may want -- in fact, I think Com-net Ericsson has expressed some interest in a two slot TDMA which would take up 12.5 and would stay 12.5 because that would be --

MR. SCHLIEMAN: Six and a quarter.

MR. BUCHANAN: -- six and a quarter equivalent. Regardless of that, even if some other agency said, well, you know, the only technology today that we can use that fits with our needs is say a 12.5 FDMA to start with, phasing later to six and a quarter, I'm not sure. I haven't looked at it enough -- maybe somebody else has -- to say that the most efficient way to do that on a planning basis is to use channels one and two as one 12.5 and three and four as the other, or possibly even with 12.5 TDMA that would stay there forever. Maybe taking two and three would be the most efficient way because you have still got to have some kind of guard band for the next one. So I don't know. It just seems like -- I know it's more work, more things to look at, but --

MR. SCHLIEMAN: I think the reason it was done the way it is, is because it is a frequency coordination nightmare any other way, and Dave Eierman is shaking his head yes.

MR. EIEMAN: Yes.

MR. SCHLIEMAN: Okay, and that's how we got there.

MR. BUCHANAN: Well, I'll defer to that. I was just bringing it up.

MR. SCHLIEMAN: I would agree with you that from a purist point of view if you could, you know, shove everything in and control everything that randomly placing it in your area you could control that, but to consider the implications of that interregionally could get really interesting.

MR. BUCHANAN: Well --

MR. SCHLIEMAN: I think Norman might have some comments also.

MR. BUCHANAN: -- obviously, I have a bias because of the --

MR. SCHLIEMAN: Limited spectrum.

MR. BUCHANAN: Yeah, the limited spectrum and the area that we live in, which, you know, in the L.A. area we have a natural geographic buffer before we reach another region. So anything that we can do to pack -- I mean, we're probably the only region under the NVSPAC stuff that has co-channel users 35 miles apart to make things work.

Our standards for everything was probably tighter than -- I know it's tighter than what came out in here as far as the 5 dBu for co-channel areas. Our is 20 dBu, 15 dB of difference, so that's the only reason I bring it up is I have that bias of looking at how much you can pack into one small area and still survive.

MR. NASH: David?

MR. EIERMAN: Yeah, David Eierman, Motorola.

Because of the ACCP issue, basically you've got, you've got to coordinate against the adjacent six and a quarter. Well, it's basically that you've got to coordinate against the adjacent channel no matter what its bandwidth, whether it's a six and a quarter, 12.5 or 25 adjacent to you, you've got to coordinate against it.

So, you know, that argument doesn't stand, that moving it around helps there.

Having the hard fast barriers of where things can go helps, you know, that you can know geographically. You can preplan slots a lot easier. You know, if you go and look at -- if you allow things to move, you go look at reforming it, VHF and UHF where things overlap, and see how fast reforming is moving there because of the overlapping modulations that are blocking using the channels that have become available.

So I think when we looked at this years ago, probably three or four years ago, the thought was, you know, that hard and fast was a lot better than the overlapping we were seeing at UHF.

MR. BUCHANAN: Okay. Well, I can accept that. I just want to make sure because, like I say, we like to pack everything we can in to have enough.

MR. NASH: Yeah, I think, David, I'd be concerned, you know, that without the hard and fast rules you could have some regions, you know, decide, okay, well, we'll have, you know, one and two, then we'll leave three as a guard, then we will have four and five, and we'll leave six as a guard, and you're going to end up with a

bunch of six and a quarter kilohertz orphans out there. So, you know, I think we need to have some hard and fast rules.

MR. BUCHANAN: Okay, that's fine then.

Then I guess the other question is, is how fast do we need to finish this up so we don't hold things up.

MR. NASH: Well, I think in this case we are -- yes, go ahead, Ernie.

MR. HOFMEISTER: Ernie Hofmeister, Com-net Ericsson.

I just wanted to go back and affirm Dave's comment earlier about receiver standards, not having them or whatever they are going to be, definitely hold up product development for this band.

MR. NASH: Okay. Yeah, the thing -- the problem I have with trying to say that we've reached consensus, at least today, is that no one out there -- I don't think any of you have had a chance to take a look at these specific recommendations. And so it wouldn't be fair for us to try to say, well, we're going to reach consensus when nobody knows what we are agreeing to yet.

MR. BUCHANAN: No, I'm not implying that we need to do it today, but I was just thinking that maybe that should be one of your lines in September also.

MR. NASH: Yes, I think in September we are going to reach consensus on this issue, and I will get these published. I'll put them up on the web. In fact, hopefully tonight maybe.

MR. SCHLIEMAN: Glen, except for the comment on the adjacent channel coupled power, aren't all of the other points of that recommendation from Don built into the 102 standards?

MR. NASH: Well, they are the 102 standards.

MR. SCHLIEMAN: Right, and 102 has A and B class specifications, so that except for the ACCP issue, which he tagged onto that, that is not part of the 102. The rest of it is part of 102, right?

MR. NASH: Mm-hmm.

MR. SCHLIEMAN: Now, we are dealing with two things here. We are dealing with interoperability standards one the one hand, and on the other hand we're talking about general use receiver standards because I think the FCC inquired about that.

Is that correct, Michael?

MR. WILHELM: I don't recall whether they apply it as --

MR. SCHLIEMAN: Receiver standards being for the purpose of proper coordination, and also user expectations of performance. I guess there is some question then about whether this issue pertains to general use channels. I sort of thought it was, but I guess we need to resolve that issue as soon as possible.

MR. NASH: I certainly would, you know, entertain, you know, that the recommendation of this committee be that they apply to all channels in the band, which would include the general use channels because, again, I agree with you. I think having receiver standards for this band is going to be critical towards being able to make efficient use of all of the channels, not just interoperability.

David?

MR. EIERMAN: David Eierman, Motorola.

I believe the vendors' position on this in past discussions here and at Project 25 in TIA meetings is that we want the amount of specifications put in the FCC

rules to be the minimal amount, and that we prefer to see, you know, these receiver specifications placed in industry standards like it has been done in TIA 603 and then in ANSI 102.

And then as Bob brought up the regional thing, I mean today not all regions do regional planning and contour protection or, you know, coordination of the thing, so maybe there should be some recommendations for -- you know, different recommendations for different regions. You know, dense urban regions have more selective criteria than rural in either the regional plans or the -- you know, or national plan, and not in the FCC rules.

MR. SCHLIEMAN: How do you feel about the RSA MSA -- let's see, what were the terms again? The rural service areas and the?

MR. NASH: Well, Class A would apply to all of the MSA, of which there is 306.

MR. SCHLIEMAN: That's metropolitan statistical areas.

MR. NASH: Areas.

MR. SCHLIEMAN: Okay.

MR. NASH: And the Class B specifications would apply to the RSAs, the rural service areas, of which there is 428.

MR. SCHLIEMAN: So that within a region, David, there could be a combination of RSA or MSAs, allowing the potential licensee to use what was needed for that area to allow him to purchase least cost equipment as appropriate.

I understand the manufacturers' position because the transmitters are nailed down, so the only way to differentiate in radio features, in quotes, is to provide

variable, for lack of a better term, quality receivers. And you know, the problem from a user perspective is that the user many times does not understand what he's buying, and then complains afterwards that he has got interference when in fact the system was perhaps coordinated for a Class A radio as opposed to a Class B or a lesser grade radio, and that's the reason for the desire to make this recommendation.

MR. EIERMAN: Well, my first thought is, you know, if you're going to have interoperability and these guys roaming all over, you're going to have Class B receivers roaming into Class A areas and they don't work.

The second thought is if you look at some of those metropolitan statistical areas, I think like San Bernardino County and Las Vegas areas as a prime example, you know, there is like a large area blocked out as the metropolitan statistical area, and all the population is in one little corner of it.

So I'm not so sure that they -- you know, using those designations is the best designation to use, and maybe left up to the regional planning committee to decide how to do something like that.

MR. NASH: Good point.

MR. MCDOLE: Art McDole.

Kind of second to what Dave was speaking of, I think we need to put in perspective, look at history a little bit, the NESPAC as you know, the Commission specifically declined to adopt receiver standards, although it had been proposed by some of the people, but they didn't leave the door open again as we moved into digital inquiry and again as we come into this they have left the door open for our recommendation on whether there should be receiver standards.

There has been a lot of talk, as Dave mentioned, in Project 25 about receiver standards and that's where the idea of the A/B units came out of the compromise between acquiring the standard, but it's very true as we speak of interruption. Those units are not going to be confined necessarily to a specific area, and you open up a can of worms with two different types of specifications when you talk about interim.

So I know the problem. I don't know the answer. But as we go through this process, whether this definition as proposed by Don Pfohl, which was his part of the 102 series, is really appropriate or not, I think we need to look at it very, very carefully.

I know generally speaking and as voiced by the manufacturers here, the manufacturers have not been real sold on a need for receiver specifications as an FCC rule and regulations. Rather, leaving it up to industry standards. So that's something we need to consider as we go through this process and review the material that you are sending out, Glen.

MR. NASH: Okay. But let me ask a question here. In looking at the band plan we have laid out that there would be adjacent to each of the interop channels a reserved channel that essentially -- you know, in the area in which that interop channel is being used becomes a guard channel.

So does that -- you know, having a six and a quarter kilohertz wide blank channel -- you know, space, what impact does that have on the need for receiver standards in the interoperability channels?

MR. MCDOLE: In my mind, to answer your question as best I can, it's your opinion only. It kind of lends itself to the analogy of coded squelch and carrier squelch; that you know you have to compromise and if you don't have it you take what

you get. And I think we cannot -- the manufacturers have not indicated to us how much more expensive it's going to be to have a Class A receiver versus a Class B receiver, so it's hard to make a judgment in that regard.

So if that's the case, then I think we have to live with any problems that we may come up with when we move a Class B receiver into a Class A area, if we choose to adopt that. That's just my own belief.

MR. SCHLIEMAN: That's assuming that the user who is moving the radio has some knowledge about what you're talking about, which he doesn't generally.

MR. MCDOLE: No, I'm not assuming anything. I just think that a guard plan is based on a six and a quarter which obviously is going to require a Class A radio in my mind, a receiver, and if you don't have it, maybe certain channels become unusable as you move into a particular area.

MR. NASH: Wayne?

MR. LELAND: Yeah, Wayne Leland, Motorola.

I mean, one of the concerns that we have as a manufacturer is about FCC rules and getting everything in there is changes, okay? Let me give you a simple answer, for example, requiring frequency stability of this amount, and then all of a sudden somebody comes up with an invention called automatic frequency control.

Well, guess what? Now you're got to go petition the FCC to change the rules, and we all know how fast that process is, okay?

So I think we have to be very careful because what you're going to do is you're going to lock in some things through rules that are going to make it very difficult

to bring new things out into the market or things that could benefit the public safety community both in cost and technology because you've got to go get rules changed.

So I mean, that's some of our -- our concern or hesitation about, gee, let's put in the rules that everything has got to speed.

MR. NASH: That kind of brings a question to mind that's stuck in the back of my mind.

For instance, in the recommendation for the modulation, you know, the interoperability mode, we did it as rereferencing some ANSI documents, standards. If the Commission adopts that in the rules, you know, and as a reference, you know, that the standard is referenced to this other document, is that reference to a specific version of that document or as that document --

MR. SCHLIEMAN: Gets updated.

MR. NASH: -- gets updated and modified in the future, do the FCC -- you know, the FCC's reference to it move along with that updating?

MR. WILHELM: No. It references the specific document, and Wayne is quite correct. If there is a need for a change, we have to go through rulemaking. It's required by the Administrative Procedures Act.

So we could not, for example, say that the modulation -- the receiver standards must conform to the most recent ANSI document. That's not permissible.

MR. NASH: Okay. So if you adopt Revision A and next week Revision B comes out, that's too bad, Revision A is the rule?

MR. WILHELM: Correct.

MR. NASH: Okay.

MR. SCHLIEMAN: The point has been made that with respect to interoperability channels roaming units, that is to say, assistance coming from outside of an MSA into an MAS would end up presumably with Class B receivers in a Class A area so they might encounter some interference, and I think that Art. McDole said that's one of the tradeoffs that you have to accept.

I guess the concern is more of a frequency coordination concern in impacted areas. The 102 standards already provide for -- in that whole sweep provide for measurements and performance criteria, and they break it down into two classes.

So I think it really becomes, as Dave Eierman said, a regional planning issue and so perhaps our recommendations should be that it be allowed to be decided by the regional planning committee.

MR. NASH: Okay, but let me throw this out. I'm a user, and I'm getting ready to go out and buy radios, and I've got a choice between a \$1,000 radio that has a Type B receiver in it and a \$3,000 radio that has a Type A receiver in it, and I'm an area where my regional planning committee says, well, we recommend you use a Type a receiver. But I look at it and say, you know, hey, it's \$2,000 a radio if I only go with a B.

What authority does the regional planning committee have to force me to go to a Type A receiver?

MR. SCHLIEMAN: Well, I think that it comes down to the frequency coordination recommendation for that area would be based on Class A in the MSA. And the frequency coordination recommendation in the RSA would be based on a Class B receiver. And if you choose to use a Class B receiver in a Class A area, then you accept whatever you bought. That simple.

But it won't fall back on the frequency coordinator if you choose to buy a cheaper radio that provides you with some undesirable interference.

MR. NASH: Well, but see now, that seems to be going back to then that A and B is defined in the rules, not by the regional planning committee. So I guess I'm confused about what the recommendation is here.

MR. BUCHANAN: Glen, Dave Buchanan.

I'm not sure what the recommendation should be but I do remember in southern California region plan for NPSTC we put some language in there that said essentially if you don't use good receivers then interference, any interference you receive is too bad. You're stuck with it.

It may be, in light of the fact that the FCC has to specify a specific --

MR. SCHLIEMAN: Standard for coordination.

MR. BUCHANAN: -- standard for coordination that it -- and still be able to be flexible we may want to put that back and let the regional plans just put some language in there that says that this assignments -- this whatever you got was based on using this type of receiver. And if you use something of lesser quality, you may receive interference and it would be on your dollar to fix it. It would be your problem to fix it. And then you can choose to live with that interference by buying cheaper radios or you can choose to not have the interference by buying the more expensive radio.

I think the issue more comes down to making sure, as Bob says, a lot of agencies, particularly the smaller ones, don't have a clue of what the difference is between the different standards of receivers, and they just look at the price. But if they

are put on notice that there is a real difference and it makes a real difference in how they operate, they would be a little more careful.

MR. NASH: Well, doesn't that that -- that our recommendation should be that, you know, frequency coordination is based upon a certain minimal level of receiver performance and buyer can buy whatever he wants, but nonetheless frequency coordination is based upon this level of receiver performance?

MR. SCHLIEMAN: I agree with that.

MR. NASH: Okay. Then do we need to have two levels of receiver performance or should we have just one?

MR. MCDOLE: That's the second question. I totally agree with your first premise, and again it's an analogy of carrier squelch versus coded squelch, which has been forever our policy, and the Commission now recognizes there are two types of interference, destructive interference and nuisance interference. Nuisance interference which can be corrected. The coded squelches is the user's problem, not a frequency coordination problem, and we have no alternative but to coordinate on the basis. We're sharing frequencies and the same thing will happen in this. We base our coordinate on a better receiver.

And even in the interop channels only have the Commission recognize if we choose to have two types of radios, if two types of radios are acceptable for the different areas, but the protection factor is based on the higher quality. I think that's our only alternative because there you just speak about with very little described here.

Some of these rural areas may have fringe areas in the metropolitan areas and vice-versa, but the actual day-to-day operations is going to be minimal in those

places where the crossover is anyway, and we in frequency coordination can kind of recognize the actual service areas of those places and do a reasonably good job of preventing interference.

MR. NASH: Well, let's get back. You commented that from the manufacturers' standpoint receiver standards should define just a minimal level of performance and not to be too specific.

How do we do that? And again, you know, I guess, if we define a minimal level of performance, that's drawing a line in the sand some place.

MR. LELAND: Yeah, Wayne Leland, Motorola.

What we are saying is is in FCC rules, which are law, okay?

MR. NASH: Mm-hmm.

MR. LELAND: And I understand the issue of if it's not law how do you get people to abide by it, and maybe the way is to -- is through the frequency coordination process. Maybe there is some stick there that you can weigh in with.

I mean, we will still, and in TIA we are, I think, very close to completing, if we have not completed already, the -- I mean, the Class A/Class B safety kinds of specs are being worked on, you know. So those can be recommended. Those are industry standards that all of the manufacturers are participating in, et cetera, and our intent is to develop them for all of the different technologies.

So, you know, and if you have FCC rules on receiver specs and guess what, if a new technology comes along, okay, I mean, you know, five years TDMA was - - nobody talked about TDMA for public safety, but now it's -- everybody is talking about TDMA as a possible solution for public safety.

You would have to go back and get another rules changes. So if there is another MA, I don't think it will be CDMA, but who knows what it is. I mean, we are coming up with them pretty quick. It's another rules change.

So I mean, that's the issue there. We believe that standards have a place, okay. We believe that they shouldn't be law except in -- you know, where the benefits override the difficulties, i.e., in digital interoperability you do need to force that one, that issue. So I mean that's kind of -- at least Motorola's view. I believe Ernie would support that as well for Com-net Ericsson.

MR. NASH: So what we're saying then maybe is that the -- that the area B standard is the minimal level of performance allowed and some ruling that says, you know, the regional planning committees may recommend, you know, that in certain areas that the A standard be used for coordination purposes?

MR. LELAND: As far as FCC rules?

MR. NASH: Yeah.

MR. LELAND: Well, what's in the B standard? I mean, if you're trying to have every -- you know, all the parameters defined, the selectivity and the bandwidth and all those things, I think -- I mean, I don't think that's the right thing to do, again, because you've got one -- you know, you're going to have three different ones, all right? You're going to have at least three different ones I can name right now.

MR. NASH: Mm-hmm.

MR. LELAND: And maybe four or five. You've got 25 kilohertz FDMA, a 12.5 FDMA, you've got six and a quarter FDMA, you've got 25 kilohertz TDMA, you've

got 12.5 kilohertz TDMA, and guess what, we get these rules in place and two years from now there will be another MA comes out and its prohibited until we change the rules.

MR. BUCHANAN: Wayne, could I ask a question?

MR. LELAND: Sure.

MR. BUCHANAN: What is the process if we reference somehow, either as part of the frequency coordination, if we reference the TIA standards and then your XMA new thing comes out, there is still a lag. You're going to have to -- the standards process is going to have to be put through to add that in, isn't it, too?

MR. SCHLIEMAN: In the coordination standards.

MR. LELAND: Yes. That's the same as the case now with the TSB we have out on all of the different frequency coordination parameters for the different technologies, and we require -- in order for the frequency coordinators to be able to use that document when somebody comes out with new technology they have got to input the parameters in there.

Now, I think there is a -- you know, if there are minor changes to things, they go through pretty fast. If it's a whole new technology, that's going to take some time so manufacturers need to be aware of that.

MR. BUCHANAN: Well, I guess --

MR. LELAND: There is no -- there is no solution that doesn't have some level of compromise in it.

MR. BUCHANAN: Yeah. I guess what you are saying is it would be better to somehow, however we do this, to reference the TIA standards.

MR. LELAND: Right.

MR. BUCHANAN: And make the changes there --

MR. LELAND: Right.

MR. BUCHANAN: -- as needed.

MR. LELAND: Right, and you can't do that in the FCC rules.

MR. BUCHANAN: FCC rules.

MR. LELAND: But I think you can do it in your coordinators, but you've got to get your frequency coordinators to buy in, and I don't know if you can legislate that or if you can -- how to do it. But say, you know, you will use these two TIA standards, you know, A or B, in your coordination and here are what you're going to tell your customers that they are getting as a result of those two, and here are guidelines, and I'm sure we, the manufacturers and TIA, would be more than happy to help develop those guidelines working with you. Here are guidelines of when to use A or B.

MR. BUCHANAN: Yeah. Well, I think we could probably come up with something through the regional planning process.

MR. LELAND: But again, I also know that problem that --

MR. BUCHANAN: -- when to do that.

MR. LELAND: -- if you get competitive coordinators, and I don't know if you'll have competitive coordinators here. Well, you will, okay. Well, the guy goes to A and he says, well, you've got to buy the \$3,000 radio, and he goes to B and B says, well, I'll coordinate for you at the \$1,000. So you have all of those issues.

So there has got to be some disciplinary way that you make that happen.

MR. SCHLIEMAN: And the common denominator to that is the regional planning process --

MR. BUCHANAN: Planning.

MR. SCHLIEMAN: -- through which the applicants go to coordination.

MR. LELAND: Okay.

MR. SCHLIEMAN: Would you agree that the TSB-88 process or its ANCI equivalent as it evolves would be the desirable approach for coordination?

MR. LELAND: Sure. I think it would be a good one.

MR. SCHLIEMAN: Just as 10-E or F or whatever it's up to now for microwave.

MR. LELAND: I think so. And obviously with heavy participation and input from the public safety and the public safety coordinator community.

MR. SCHLIEMAN: And with respect to interoperability channels, since those are really the only things that we have zeroed in on with the ANCI 102, and the 102 series has the A and B class parameters for receivers and other aspects of the radio, it would be not unreasonable then to tie that to the TSB-88 with respect to the 700 megahertz interoperability channels.

MR. LELAND: Well, if -- if I understand what you are saying, I mean, the TSB-102 is a series of some 30 documents, 30 plus documents, okay?

MR. SCHLIEMAN: The whole 102 series is --

MR. LELAND: Yes.

MR. SCHLIEMAN: -- a summary --

MR. LELAND: Yes, but what's on the interoperability standard that is in this document that's being recommended it's only, you know -- for the voice it's only two or three documents, okay?

MR. SCHLIEMAN: Right.

MR. LELAND: Those do not include receiver standards.

MR. SCHLIEMAN: That's correct. So we're talking about an additional document.

MR. LELAND: And again, I'd have the same comment on the receiver standards there as well because you're -- I would have to think about that a little bit more, but again it depends on, you know, what parameters you want to put in there and a lot of it's going to depend on what you come up with a frequency plan, the channel block plan that says are you going to have six and a quarter adjacent, you know. That's going to influence the interference criteria, et cetera.

They are going to be available -- you know, they are not going to be used all the time, at least 20 of the 32 or whatever the correct number is. I mean, all of those are factors in there.

MR. SCHLIEMAN: Perhaps an analogy might be made to Part 101 microwave rules where there are different classes of antenna "bend" was -- "beam" was, I should say, allowed according to interference conditions. However, if you have interference, you have to go to the tighter regardless, a tighter beam width. And perhaps if the rules were written that way, in conjunction with the coordination process so that the system owner has the responsibility in the event that adjacent channel interference becomes a problem that could have been solved with a better receiver, it's his problem to solve it, and it's written in the rules that way essentially, just like the antenna situation in the microwave rules.

MR. NASH: Yeah, but I think the antenna situation in the microwave rules is infinitely simpler than what we are dealing with here.

MR. LELAND: You don't change out your fleet of portable and mobiles.

MR. NASH: Well, you know, the issue here, you know, and you brought it up, you know, is that we are looking at the moment at least four different combinations of technology and bandwidth. And the impact of putting technology A immediately adjacent to technology B is different than the impact --

MR. LELAND: Right.

MR. NASH: -- of A to A or A to C.

MR. LELAND: Right.

MR. NASH: You know, so the complexity of the frequency coordination process is much more difficult because of these four technologies that we're contemplating and allowing in this band.

MR. LELAND: See, even in the perfect world, we all know this, right, let's define the perfect world, is you get all of these receiver standards into the FCC rules.

Well, guess what? Somewhere there is going to be a problem of interference again, right? I mean, it's going to happen. So it's not going to solve everything.

I know what you guys are trying to accomplish and to do. What you are really saying to the public safety community, and it's probably true in a lot of cases is we have to legislate to get you to do the right thing because otherwise you guy won't and it's not because you're bad guys, it's just because you don't know, and we have -- you know, we have slick salesmen, and other people have slick salesmen that go in and sell, you

know, they will undercut. If Ericsson comes in with a price, we'll sell our lower -- you know, all of that's going to happen no matter what.

MR. SCHLIEMAN: I was going to take a different approach.

MR. LELAND: So I think the educational process.

(Laughter.)

MR. SCHLIEMAN: I was going to suggest that from our perspective in government if we don't have a mandate to justify doing something, then we won't be able to do it. It's sort of like refarming, you know. Unless there is a stick and a carrot, well, we have the same problem and we don't need your help to get there.

MR. LELAND: Maybe the --

MR. SCHLIEMAN: Although the two forces working together --

MR. LELAND: Maybe there is room in the rules for a "mandate," mandate without being specific that says, hey, if you -- if you, you know, achieve the -- who is ringing? His bag is ringing.

MR. SCHLIEMAN: His data radio is going off.

(Laughter.)

MR. LELAND: It's the typical dance. Is it me or whoever? Sorry about that.

MR. SCHLIEMAN: I was going to try to zero in on this a little cause, again, there seems to be some question about the application of receiver standards to the whole spectrum of general use radios as opposed to the interoperability standard for interoperability channels.

If we could zero in on the interoperability standard, that would at least allow us to perhaps come to closure on that, and then deal with the general use channel separately. But I realize that a radio is a radio and you're going to use it on both channels.

But what I -- what I am looking for, in my view anyway, is that it be tied to the coordination, and I think we kind of all agree that the TSB-88 product that exists right now from TIA, which is in an evolutionary process with all of the new types of radios that are coming out that we have to coordinate against, and that includes commercial spectrum --

MR. LELAND: Right.

MR. SCHLIEMAN: -- adjacent to us. That we need to tie that to receiver standards so that there is some point of reference for the coordination, and if the coordination is in a rural area, it can certainly -- you know, because of lower density of radio communications equipment, channel usage -- could certainly accommodate a somewhat lower grade radio receiver.

So I guess that's the direction that I was looking for, some way of tying those things together, so that it was referenced as it in Part 101 to the coordination requirements similarly be referenced in Part 90 for the 700 megahertz band that we deal with, and specifically for the interoperability channels and possibly for the general use channels in the same manner.

MR. LELAND: Yeah. I think any way you can do it through the coordination process instead of through the rules would be a much better solution because it would give the flexibility to adapt to real world conditions as they change,

whether that is technology or whether that's people, more people coming in and landing on adjacent channels, et cetera.

MR. SCHLIEMAN: So if the rule only stipulated that coordination be done in accordance with the TSB-88, and that the product specify the receiver level for which that coordination was based, that would be adequate, in your review?

MR. LELAND: I would find that acceptable, yeah.

MR. SCHLIEMAN: Okay.

MR. LELAND: But I don't know if that could be put into the FCC rules or now. Well, we can try.

MR. NASH: Ernie?

MR. HOFMEISTER: Ernie Hofmeister, Com-net Ericsson.

I just basically want to say that Com-net Ericsson would agree with most of the -- all the statements that Wayne said regarding Motorola and the manufacturing community. We certainly would support receivers not in the rules but in industry standards.

And if you think about, I mean, putting them in the rules like we talked about, the transmitters are specified, so we have transmitter specs for six and a quarter, 12.5, 25 kilohertz transmitters for mobiles and for base stations, so that's sort of six things right there.

Now, if you wanted to specify receivers for those aside from FDMA and TDMA technology, and you had Class A and Class B, then you would need two sets of receiver standards for each of those six, and they are likely and will be different. So

getting those right, I think, is a major challenge, and then they become law. We certainly support TSB-88 as a way to coordinate.

My only other comment, I guess, would be in terms of interoperability channels where that -- whether that deserves special attention because those are, you know, sort of nationwide. We have specified what the common error interface is. One might be able, at least in my mind, to come up with an argument where you might specify a receiver standard for that particular mode.

MR. NASH: You know, let me just make a comment here, and be, you know, somewhat of the devil's advocate on, you know, that the -- the regional planning committees or some other body, you know, make a decision on almost a case-by-case basis as to whether or not to use an A or a B receiver. It certainly opens the door for somebody to make an accusation that your decision was capricious, and at least it would make me nervous seeing on a regional planning committee that somebody would come along and say, well, you've based the decisions for yourself on the B receiver and you're making me go to the A receiver. You know, there is a conflict of interest in your decision-making process here.

So to the extent that those -- that flexibility is not in the regional planning committees' choice -- you know, there is -- you know, there is problems with it being it -- you know, a decision of the regional planning committee.

Art?

MR. MCDOLE: I just had a comment on Ernie's last remark that go to the two different standards. And I think we have a case of the tail wagging the dog.

The Commission report and order very specifically said that all radios must be capable of operating on interoperability channels. Therefore, any standard that is set for interoperability channels has to be set for all radios. You can't have an A and a B for interoperability. They all have to be whatever grade, which leads almost to the point we were discussing of coordinating around the B level and telling people, hey, this is what you are paying for, it's what you get. It's up to you. If you want a better radio, they are available through industry and recognize the fact that they if they desire additional protection buy that radio and point out in the instances, not mandate, the part of the -- either both the regional planning process and the frequency coordination.

That would be advisable in certain instances to provide the higher level of insurance for yourself just as we now do to include a squelch fade. You may get some signal but it will be below a -- only a nuisance interference. If you don't want to have it, include a squelch.

We are in a different world now, and it's going to be different for the bid error rate rather than the capture effect may take place, but even so I could agree with you, I wouldn't want to be in the place of mandating anybody what kind of receiver to buy, but would not hesitate to be a place and say we have coordinated around this level. If you want added insurance protection, you should recommend that you buy a better receiver, and I'd be -- that's as far as I think we should take it.

And I agree, the only thing I think the rules should do is reference the fact that whatever standards we select are available through TIA and the industry, and that it would be the prerogative of the coordinators and the planning committees to recommend, but not mandate those.

MR. SCHLIEMAN: I think, with respect to Ernie's comment, he was referring to a multi-mode radio where it would not necessarily be required that it be A throughout the radio but only for the interoperability mode.

MR. NASH: But Art, I think, you know, the concern I would have if we coordinate everything based on the B level of performance is that in the major metros where you really need the A performance in order to maximize use of the spectrum, if we're only going to coordinate based on the B level, we aren't maximizing that.

And so, you know, the initial people go in based -- they buy B level radios, and now I come along and I want to try to squeeze in. I'm willing to buy an A radio. But I can't squeeze in because the other guy has a B level receiver that I'm impacting. You know, so I -- you know, that's the dilemma there, you know, is that when you're talking about receiver performance it's the other guy's radio that you're impacting, not your own. You don't have any choice about what level you bought.

Yes?

MR. OVERBY: Stu Overby, Motorola.

Just listening to the discussion, I was going to make a recommendation from a process standpoint.

You can have three levels of guidance which you can get. One is FCC rules, one is the national plan that the implementation committee is working on, and then the third is the regional plans.

Possibly an approach to consider is to have the FCC rules require that the regional plans conform to a national plan, and then in the national plan you lay out

references to TIA standards, and then that would provide some consistent guidance to the different regions just as a process approach to consider.

MR. NASH: Understood. That still requires, you know, some sort of process to go through in order to change it.

MR OVERLY: Right.

MR. NASH: And I think that was Wayne's concern, you know, as to whatever that process is it's probably more cumbersome than we want to try to deal with.

MR. SCHLIEMAN: I think Stu's approach is perhaps less onerous than changing the rules. It's only a plan modification as opposed to an NPRM, all that other stuff. Good suggestion.

MR. HOFMEISTER: Ernie Hofmeister, Com-net Ericsson again.

Maybe I should amend my previous comments regarding whether receiver standards should apply to the interoperability channels, and that's basically if we -- the way these are laid out if the adjacent six and a quarter channels on either side of this 12.5 are truly going to be guard channels, then it's not clear that it would make sense to have the receiver standards required for the interop channels.

MR. BUCHANAN: Dave Buchanan.

Yeah, I think I agree with that. I think we fixed pretty much that problem by shifting that over. So probably we should focus more on just the general use and how to maximize the use of the spectrum.

And from what I hear, I think somehow we need to get it into the -- regardless of Glen's concerns, and I can certainly understand them, I still think it needs -- probably it looks like it's going towards using the regional planning process and

basically it probably will go down to saying agency A and agency B, you guys -- you know, you asked for 20 channels each, and if you want to use these receiver standards we can give you 20. If you don't, then you get 15 or you get 10 or whatever.

And usually that approach, when you lay it out and you lay it out and you say here is what you get based on how much you want to spend it makes a decision for you and it doesn't make it all that arbitrary although we do have to keep in mind that once somebody goes in with a B or the lesser standards then everybody else has to work around that.

So I think up front in the spectrum impacted areas, the very urbanized areas, we really -- the regional plans are going to have to look at saying to everybody, hey, to make this the maximum for everybody here is what you're going to have to do.

MR. NASH: Well, I don't have any problem with saying, you know, that coordination is going to be based on TSB-88. I think the difficulty comes about when you say, well, we're going to us TSB-88 referenced against a specific kind of receiver or referenced against what anybody bought. And if we're going to say that specific kind of receiver, you know, is -- you know, the B level receiver except that the regional planning committee can recommend an A level receiver, you know, in certain areas.

MR. SCHLIEMAN: There are areas that we're going to be dealing with that do not have A and B parameters established for them yet, if ever. And so I'm not sure that we necessarily want to try to nail that down yet.

I would like to see if there is general agreement that we specify TSB-88 coordination principles and require the coordinator to coordinate against regional plan

required receiver performance. Any interference that can be resolved that occurs at a later date by a better receiver becomes a problem of the receiver owner to correct.

No comments?

MR. BUCHANAN: I don't think you can make that work.

MR. SCHLIEMAN: Why not?

MR. NASH: I'll comment.

MR. SCHLIEMAN: I mean, it's parallel with the microwave rules in a way.

MR. NASH: Not really. How --

MR. SCHLIEMAN: The microwave rules say if you have interference you need to improve your antenna and they give you choices and you can pick the lower choice if you wish. But if you end up with interference, you have to upgrade your antenna. It's in the rules.

MR. NASH: But I guess -- you know, the problem is, Bob, you know, how do you prevent the accusation, you know, that the decision of the group is capricious, you know, just to make you buy a better -- go out and buy new radios?

MR. SCHLIEMAN: It's not capricious. If you don't have interference, you can use a cheaper radio. It's your choice. But the coordinator has got to tell you that it was coordinated against the regional plan's requirement for a specific level. And New York City or L.A., you're going to want to -- ANCI 102, type A receiver. I don't think there is any question about that. What you want to have in Delaware County in New York State might be something totally different.

MR. BUCHANAN: I think I agree with Bob. I would only say that I'm not sure we can -- we probably can't come up to the consensus today. I think we need to -

MR. SCHLIEMAN: Well, let's throw it on the table and let's see if people come up with some thoughts on it.

And I like Stu's idea of putting it in a national plan where it has some easier chance of modification as required in the future.

MR. BUCHANAN: I'm just wondering if -- if the fact that you're tying it to the TSB-88, that you can actually -- from that process you can show someone one way or the other and you say, look, here's what ends up with B receivers and here's what ends up with A receivers as far as the channels that can be used, and that might solve the problem.

MR. SCHLIEMAN: Yeah, that's true for now. And then what happens a year later when somebody else comes on?

MR. NASH: All right. We need to wrap this.

Bob, let me ask you, you know, to write up a specific recommendation and put it up -- write up the specific words and put in the server so that everybody can look at it and think about it. And again, at the September meeting we're going to have to come up with a final recommendation on this. All right?

MR. SCHLIEMAN: Mm-hmm.

MR. NASH: I do have some concerns, you know, that even -- you know, referencing the ANCI 102 documents, you know, that those are specific to the FDM Phase I and Phase II radios and, you know, the impacts that, you know, both the Ericsson

2 slot and also the TETRA 4 slot. Those receivers may not -- it may not be appropriate to have those same numbers applicable to those TDM type receivers, and I would certainly encourage comment on that issue, you know, from Ericsson on this.

So let's put it on the server. Let's get some comment and some good discussion on it, and we'll make a decision in September.

Is that agreeable to everyone?

(No response.)

MR. NASH: Okay. Moving on, software defined radios.

MR. WILHELM: Glen, would this be a good time to take a brief break, a little break?

MR. NASH: Yeah, if you want to. That's fine. Take a 10-minute break?

MR. WILHELM: Sure.

(Whereupon, a recess was taken.)

MR. NASH: Okay, next item on the agenda is the discussion of the software defined radio, and Robert Schlieman was chairing that group.

(Pause.)

MR. NASH: Why don't we skip down then. David, since you're here just a quick report on your -- the wideband radio project.

MR. BUCHANAN: Okay. Well, I have the draft paper I can hand out. We have a bit of a problem in that a lot of the assumptions in this paper -- that's being handed -- for the technology issues is based on the Statement of Requirements coming out of the interoperability subcommittee that won't meet until this afternoon.

So what I would like to do with this is basically postpone the main discussion on it until this afternoon after the interoperability, after my work group report at interoperability is discussed and agreed to or not agreed to, and then basically we could take this document up.

Now, if there are any specific concerns that someone had, I didn't get -- frankly, it went out on the internet but I got one brief comment from one person who just said they agree with the assumptions. We need to get on with it. We really want to implement wideband data quickly, so it looked good to them. But I haven't heard from manufacturers on, you know, any of the assumptions I made, the research that I did into this, and so probably give some of you a chance, if you didn't look at it on the internet, to look it over anyway.

But if there is any, you know, brief comments right now, we can entertain those. Other than that, we'll take it up this afternoon.

MR. BEEFERMAN: Steve Beeferman, Data Radio.

I just want to make a remark that perhaps people could think about in the context of furthering the discussion this afternoon.

We have some comments which I will make regarding some of the issues you raised, which I thought were very useful to promote discussion, but one of the things that Data Radio has considered is the relationship between a narrow band and a wideband standard in terms of common technology. and the issues related to those.

And in particular, there was, I guess, a concern for issues about performance and the user requirements regarding motion and speed of the vehicle and the ability to transmit wideband data in that environment. I'll go into that this afternoon.

But I guess the question is has -- you extrapolation -- I think you used as part of your philosophy an extrapolation of what was given in the P-25 standard for data, extrapolating a certain bit rate into a certain bandwidth and then looking to see if that bandwidth could support that capability as it relates to the current rules and throughput that was -- or bit rate that was fostered by the rules.

Did you give any consideration to the fact that apart from the bit rates themselves and the pure math of the impact of any other aspects of the narrow band data transmission criteria?

MR. BUCHANAN: Well, I -- actually I did look some at, you know, the project 25 narrow band data, but more than that the research I did was more just the math and --

MR. BEEFERMAN: Okay.

MR. BUCHANAN: -- you know, what you could fit -- you know, what bandwidth would fit and more comparing it to GSM and what they are doing with some of the EDGE technology.

MR. BEEFERMAN: Right.

MR. BUCHANAN: And whether -- because that has come up also.

MR. BEEFERMAN: Just to give you a flavor of why I brought the matter up is that one of the things that we were considering as far as issues is that in time slot environment, as you get further distances, and I know range was an issue, is that the transit time and the fading environment may cause problems in terms of winding up in the right slot between the time that a signal is transmitted and the time it reaches the code level.

MR. BUCHANAN: You're speaking of like a TDMA?

MR. BEEFERMAN: Yes.

MR. BUCHANAN: GSM type thing?

MR. BEEFERMAN: Correct. Correct.

MR. BUCHANAN: Yeah, I agree with you. I think that's going to be an issue.

MR. BEEFERMAN: So you could wind up with some of your signal in the wrong time slot.

MR. BUCHANAN: Right.

MR. BEEFERMAN: Therefore, I think somehow, and I think this is a technology question, that's why I raise it here and not an interoperability issue, is the question of those kinds of things probably need to be looked at in the context of both worlds so that if there is an attempt to try to use a common scheme to satisfy the request for a standard, that they are evaluated basically is the --

MR. BUCHANAN: You're saying that we should, since we picked project 25 for the narrow band, we should also look at -- we should be looking at that also in the wide --

MR. BEEFERMAN: What I am suggesting is that --

MR. BUCHANAN: I mean, where --

MR. BEEFERMAN: -- just put everything aside in terms of what is, you know, existing. Look at it from the point of view of existing as it relates to the P-25 standard, and then look at it from the point of view of a narrow band and a wideband standard how they relate to each other and what technological problems occur in both,

and that pertains to, you know, such things as range, channel access scheme, speed, fading environment, the impact of the fading environment. Because I think what ultimately is going to be the direction is that there is going to be a desire to have one kind of data capability that supports both for a lot of practical reasons.

MR. BUCHANAN: Well, why don't we think about that and then --

MR. BEEFERMAN: Well, I --

MR. BUCHANAN: Well, no, what I'm going to say is let's bring it up again this afternoon after we have talked about more the user needs document and hash that out a little bit, and then that should naturally lead into what you are saying there.

MR. BEEFERMAN: Okay, thank you.

MR. NASH: Okay. Anything else?

(No comment.)

MR. BUCHANAN: Then basically we'll just postpone this discussion until this afternoon. So if you are interested, please come back this afternoon.

MR. NASH: Okay. Okay, back to you, Bob, with software defined radios.

MR. SCHLIEMAN: Okay. I'll restart my machine again like I started earlier by mistake.

As a result of comments made by Steve Beeferman, Data Radio, Technology Work Group 2 was tasked at the April 6, 2000, meeting in Washington, D.C. with reviewing software defined radio technology.

The Federal Communications Commission has opened a notice of inquiry into software defined radios, ET Docket 00-47, FCC 00-103. That NOI overlaps the time within which the technology subcommittee is to review SDR technology.

A review of the FCC's electronic comment filing system filings that had been submitted in response to the NOI indicated only one response from Nortell Networks.

The SDR Forum appears on the internet. The SDR Forum is a forum. The forum web page states that it is an open forum and a not for profit corporation. Most of the information listed on the SDR Forum web site is password protected available only to members. Membership in the SDR Forum ranges from \$1800 to 6,000 -- if I have my numbers correct because I wasn't looking at the web site when I wrote this -- as a function of the NAVAR Company's gross sales or some ratio like that. And a governmental entity wishing to join the SDR Forum would have to pay somewhere around \$2400 I think it was, according to information posted on their web site.

One document -- which we didn't do by the way. One document describing the essential attributes of SDR was found in an open access file, a letter from Ericsson Radio Systems, AB. This document was copied from the web site and transmitted over the TWG-2 list server.

As a result of that transmission, an e-mail was received from Harlan McEwen regarding a presentation made to IECF on software defined radio, and an e-mail was submitted by Al Ittner, Motorola.

Motorola is a member of the SDR Forum. The Ericsson letter by Dr. Peter Olander's, comments were similar to those expressed by Mr. Ittner. However, the letter was more detailed and are as follows:

One, software defined radios are a collection of a system and implementation technologies. They are not an interface standard nor do they replace existing or future standards.

Two, SDR technology will not cause and network systems will not permit products from operating outside of their defined network standards.

Three, SDR technology will not inherently result in a move toward greater uniformity of standards.

Four, error interface standards and system deployment standards, not SDRs, determines spectrum efficiency although SDR technology can enable the emergence of future error interfaces which provides spectrum efficiency improvements.

Five, SDR systems can act as a gateway to enable interoperability between public safety agencies operating on a variety of wire line and wireless networks. Examples would include multi-agency operations, including many levels and functions of government.

Six, SDR technology may likewise enable multi-regional network operators to offer wider coverage areas and facilitate roaming agreements between networks that are operating on different standards.

Seven, SDR technology is an evolutionary, not a revolutionary process. Emergence of SDR technology is currently in progress and many software capabilities associated with SDR are already incorporated in today's radios and systems.

Eight, commercial adoption of SDR technology will be moderated by practical constraints in cost size and power consumption.

Nine, conventional spectrum management policy will still be required and will not be replaced by SDRs.

Ten, no immediate FCC rule changes are needed to accommodate SDR technology. However, I might add that FCC enforcement of such high technology equipment will be required and the Commission's resources, in my personal view, will be severely taxed to ensure that operation of SDR transmitters are in compliance with their instruments of authorization and to protect public safety radio communications from the debilitating interference. Failing to do this will render radio communications generally to the same situation that developed two decades ago with 27 megahertz citizens band radio. They gave up licensing because it was just too much for them.

About the same time, I might add, that synthesized two-way radios became very common and at the same time that maintenance technicians were no longer licensed by the FCC and so there was no carrot and stick, your job was dependent upon your adherence to the rules because if you lost your license for failing to observe the rules properly, you know, by losing your license. It affected your livelihood and you certainly paid attention to that.

So without all of those -- with those contributing factors, I should say, things went downhill.

Well, with SDR radio we are going to basically have military technology available in the common place.

Before SDR can be implemented ubiquitously by public safety entities, the size, cost and power consumption will have to be -- will have to reduce considerably. The underlying concern for the NCC is that while SDR may facilitate interoperability by providing an implementation of technology that bridges systems applying different standards there is still the need for a common standard with which one can plan to have available to ensure interoperability.

If a required technology or protocol is not available in the SDR software repertoire, it still will not function as an interoperability mechanism. Therefore, an SDR will not in and of itself be the guaranteed magic bullet of achieving interoperability.

MR. NASH: Bob, it's safe to say then that an SDR provides a platform that may enhance the ability of public safety agencies to have interoperability but only to the extent that that SDR incorporates whatever standards and whatever variety of frequency bands that were faced with operating within.

MR. SCHLIEMAN: And signaling protocols --

MR. NASH: Right.

MR. SCHLIEMAN: -- and system permissions and all of the other stuff that one has to have now. It just makes, it's really a multi-mode radio.

MR. NASH: Right.

MR. SCHLIEMAN: The ultimate multi-mode radio is purely what it is.

MR. NASH: So to the extent that there is a greater variety of frequency bands and a greater variety of operating modes that are being employed the complexity of the SDR rises as it is forced to include those capabilities within its performance parameters.

MR. SCHLIEMAN: I don't know if I would use the word "complexity" necessarily. The capability of the radio properly implemented can rise to the occasion, yes.

MR. MCDOLE: Question only. Since obviously this is under -- currently operating under federal requirements, the FCC requires type acceptance.

Would every mode of that radio have to be type accepted and accepted by the FCC before it could be used and licensed?

MR. SCHLIEMAN: I would assume so, but Michael could answer that perhaps since it's an FCC question.

MR. WILHELM: There is an outstanding notice of inquiry that will address that question or does address that question.

MR. SCHLIEMAN: Good answer.

MR. WILHELM: Thank you.

MR. NASH: Well, if I might expand upon that, I would refer back to the discussion that came up several years ago with -- as synthesized radios started hitting the market and there were questions about users being able to program frequencies, and the Commission eventually placed into the rules that users shall not be able to program frequencies into their radios. You had to have a separate device which in many cases turned out to be a paper clip, but I think you --

MR. SCHLIEMAN: Satisfied the rules.

(Laughter.)

MR. NASH: You know, an SDR radio is just a much more complicated version of that. You know, it's not only programming frequencies, but now it's also

programming operating modes, and the extent to which individual users may be sophisticated enough in order to do that properly, I think, is probably -- you know, more problematic than it was on just letting them program frequencies. So more of a comment than -- yes, Steve?

MR. BEEFERMAN: Steve Beeferman, Data Radio.

Permit me to say that I think you are looking through the wrong end of the telescope. I think I fully understand, Bob, what you pointed out about the characteristics of the software defined radio, and it wasn't for that purpose that I suggested that this group take note of it. I think in itself it is important to everybody and the public safety community should be aware of it.

But I was aware of the notice of the inquiry and as stated before that notice, you know, raises a lot of questions about what the Commission should regulate, not regulate, and, of course, Bob has pointed out, as we all know, that regulation -- when regulation comes the ability to manage and have the resources to manage.

But in effect, over the last couple of months I have been trying to understand what the perception of software defined radios as well as its development. One of the things that probably you are all aware of is that in the public safety community there is use of commercial services, particularly CDPD as well as cellular, for that matter, voice-wise as an adjunct service, and probably for the foreseeable future public safety will utilize commercial services as an adjunct to meet their spectrum needs, communication needs.

It appears to me, and this is my view from trying to understand where the direction of things are going, is that the seven megahertz band is going to be multiple

groups of users among these commercial services as well as the guard band classification of systems in addition to the public safety domain.

A lot of those potential system operators, at least in the commercial side, are taking interest not only in the commercial side but the guard band side because similarity of resources makes it more economic for them to think of being a guard band manager as well as a commercial operator.

Take that one dimension further. The fact is that if they can obtain a product that can be configured to work as a guard band radio, as a commercial radio and as a public safety/interop radio, that's going to bring the potential cost down of that technology probably faster than anybody will, you know, be able to prove at the moment, but I think, you know, we all see what happens in the world of internet-related products and services, computers. You look, it's very easy to see.

My point is simply this: That I think the concern that this group should have in relationship to the NOI is the question of whether the work product here as a standard can be controlled in some way through the regulatory process. Otherwise, you have a template for trouble because of the fact that if in fact a common radio platform or let's say a radio platform operating at a band that can be set up to operate both in a public safety mode as well as the commercial mode for the simple purpose of saving money and having a common product, that product then on a commercial side could be theoretically operated on the public safety interoperability side.

Then you have the potential of having radios out there that operate under a circumstance where in fact interoperability becomes paramount terroristic -- terrorist event, okay. You have a lot of people, public safety agencies working together to deal

with the situation, and then you have potentially people with radios that are presumably commercial radios, but then become intrusive as far as communications are concerned.

I think that it's important to have that subject in mind and have some response by the public safety community to the FCC about that issue.

I just talked earlier with Ron Haraseth and asked to see if APCO had a position on that. Apparently they don't. They understand -- he understood the problem, but there is not, I guess, a recognition of the potential and therefore not perhaps any input plan for this notice of inquiry.

And I just since pretty much public safety community here, largely on the, you know, specification side is in this room, I think it's something that you should be concerned about because I think we as manufacturers are going to try to build products that are as universal as possible to make them cost effective, to take advantage of the volume that's out here, and I think the 700 megahertz band is going to be the idea platform for that.

MR. SCHLIEMAN: Yes, Steve, I agree wholeheartedly that the -- the impact of putting basically a military designed radio in the hands of the general public offers quite a latitude from domestic terrorism all the way down to just illegal operation, unlicensed operation. And I think that there is a lot of -- a lot of hazard in this.

I'm really not comfortable with the way things have been coming out recently, that there will be necessarily adequate controls on it; my personal view anyway.

MR. NASH: Again, I would point out, you know, that nothing prevents a terrorist or John Q. Public from going down, you know, to his local -- excuse me, Wayne, t his local Motorola service station and buying --

MR. LELAND: What about Ericsson?

(Laughter.)

MR. NASH: Motorola service station and buying a Com-net Ericsson radio --

(Laughter.)

MR. NASH: -- that operates in the public safety bands and just based upon the interference problems that we have had, you know, with -- you know, there are many, I'll refer to them as being unscrupulous technicians out there who will program up a radio on anything and turn a user loose, you know, and those are not software defined radios. They are fixed-designed radios.

So I don't think, you know, a software defined radio necessarily makes that problem worse except to the extent, you know, that the end user is able to program that radio to operate in any mode on any frequency, and that's the issue, you know, that the -- you know, the Commission at least, you know, prevented us from doing, you know, under the existing rules. And to what extent they might relax those limitations are not -- you know, under an SDR-type ruling, I don't know.

MR. BEEFERMAN: Two things.

One, the comment filing period hasn't closed yet so if anybody, including this group, is going to put in anything, there is still time.

The second comment is I think you have to span the view of things. It's not to say that a software defined radio platform might not have licensees to provide software to produce different product in concert with different markets. I mean, we're talking about a computer. We're talking about software.

You know, think of the Intel chip being the radio platform and think of the software as being the operating system application, whatever you want to call it. That is very highly likely.

So the fact that you can -- it won't be the user installing software as much as the availability of software that anybody can install.

MR. SCHLIEMAN: I'm also reminded of the "I love you" virus, et cetera, et cetera.

MR. NASH: Yeah.

MR. SCHLIEMAN: Where a tool that was produced by a manufacturer to make using a computer easy became the mechanism by which they write all of these viruses, and with devastating effects.

So the problem is if you -- if you make it available to make it easy for somebody, somebody else will turn it around and use it against you. That's the scary part.

MR. NASH: Yeah. Yeah. I would point out, you know, in many ways software defined radios are on the market today. It's called flash programming, you know, and Motorola and Ericsson both sell radios that, depending upon what features I buy, they enable features in the software or they are disabled, and they upgrade that software by sending me out a disk and I flash the ROM and I have a radio that now works in a new trunking mode, you know.

So, you know, we have software defined radios out there today. You know, the extent to which the capability of those radios may be expanded to include additional features or performance, I think, you know, is -- there probably isn't a whole lot in the rules to prevent a manufacturer from doing that.

MR. BUCHANAN: Glen?

MR. NASH: Yeah.

MR. BUCHANAN: I've got a couple of questions or comments.

I guess, I don't disagree with much of anything that's been said here. I'm just wondering where we go with it. It doesn't appear to me that it impacts any of the recommendations we have made for standards for interoperability. I don't know if it's something that we should recommend to the NCC full committee that they make some kind of comments on this or not. It's going to have an impact, there is no doubt about that. I'm not sure -- I'm still not sure in my own mind that this group is the forum to bring that impact out. It seems it's more of a --

MR. NASH: Well, I would agree. The bottom line question here is, is there a recommendation from this subcommittee to the NCC that official comments be filed on the part of the NCC to the Commission relative to software defined radios.

MR. BEEFERMAN: I think you guys have a great vested interest in where this goes. I certainly will admit that a lot of people don't know a lot of the answers because it's a learning process.

What I think ought to be in the record as a response from those of inquiry that this group has a strong interest in the effects of this technology; that secondly, in some way it needs to be officially kept informed. I can't suggest a process because I'm not aware of those detail. But obviously, if the notice of inquiry closes and it becomes a - you know, using just at that point in time the input that they have, then -- and things change as technology evolves in this forum, then how do you get connected up and make sure that your interests are protected?

If anything, I think the response to the notice of inquiry is to acknowledge -- get acknowledgement from the Commission that you have a vested interest in how this thing turns out, and not necessarily put an end point on it.

MR. MCDOLE: Glen, I would respectfully submit that the only real responsibility I can see for this group, and I do think we have one, the Commission has specifically set aside this portion of the spectrum for public safety use. The software defined radio, again, can be programmed theoretically to cover that portion of that spectrum.

And any comments that's filed that relate to protecting this spectrum for public safety use with appropriate authorization would have to be granted before any radio, any software defined radio could be programmed into the public safety portion of this spectrum. That's my concern, that others could program in there with a radio of that type without authorization.

MR. NASH: Well, but I think -- you know, a recommendation, you know, that the radio, you know, probably should not be end user programmable; you know, that it should be --

MR. SCHLIEMAN: Without a paper clip.

MR. NASH: Yeah, without a paper clip. You know, that it should be programmed -- programmable only through authorized facilities or shops or, you know, some wording, and that the responsibility for ensuring that a radio so programmed is programmed only to operate on frequencies and in modes that are authorized to the end user, that there be some, you know, enforceable responsibility placed upon those authorized shops, you know, with an applicable penalty.

And I think, you know, that's one of the things that we saw go away over the years, you know, is that, you know, radio shops could program a radio up on any frequency in any mode, and they -- there was no penalty if they put somebody on a public safety frequency who didn't belong there, or on any frequency that didn't belong there.

MR. MCDOLE: That's my point exactly. We have all had fishing boats programmed on the police channels and things like that.

MR. NASH: Yeah.

MR. MCDOLE: And I am concerned of this new spectrum. If we have a rule for the NCC will be simply to reenforce in the manner that you say, that they must be authorized before anyone could program a radio with penalties, so whether it's done by the dealer, certainly not by the field user.

MR. NASH: Yes, Carlton.

MR. WELLS: Carlton Wells, State of Florida.

I want to echo what was just discussed. That's where I was going to lead my point toward and begin it with what Bob Schlieman stated earlier, that started with citizens band radio, migrated through synthesized radios and then unlicensed technicians, that was one of my concerns during the reforming rulemaking. The retro kits that you might put in your wideband equipment to make it narrow band for reformed channels didn't require a licensed technician to do so, and that was one of my concerns.

And now we're into the software-definable radios. Whether it be a hardware radio or a software radio that's defined, either one can be put on a public safety channel.

So it boils down to enforcement. Possibly tagging the software to the owner of that software and having that show up in the radio on who last modified it for the different frequencies or setups in that radios so that if there is a problem with a user on the radio, you would go into the radio with software and see who last modified it, and go back to that technician, go back to that radio shop, go back to the owner of that software that's registered and hold them responsible for it. And maybe that too will prevent that software from be pirated to other users in a clandestine nature.

MR. SCHLIEMAN: It's just this kind of brainstorming thinking that needs to be done, and I think slowly people are getting the point about what issues can be raised, and obviously it's the SDR's potential power that makes all these other previous attempts to access channels really going to become trivial.

There is a technical advisory counsel as part of the Commission that is examining this. I don't know how -- what the interrelationship is between an FCC advisory group and another one. Maybe Mr. Wilhelm can tell us. But perhaps maybe one of the committee members can participate in that council, and there will be some interoperatable or interchange of information on that technology so that we would be aware of what could and could not be controlled, what could and could not be regulated in a way such as Carlton, was it, suggested; that, you know, maybe in the technological way we can -- that FCC might mandate certain identifiable parameters with any software to protect the interest of the owner and any other methodology that potentially could provide protection against intrusion.

MR. NASH: Okay, let me suggest -- I'll sit down this afternoon and try to draft a brief statement. And since, I guess, we're going to try to get together after the interoperability meeting, that we can go over.

Essentially the statement will refer to our concerns about the potential for SDR radios to be used in an improper manner and that there need to be some enforceable rules established to limit that probability.

MR. WILHELM: Glen, can I add that there is going to be a presentation on software defined radios tomorrow by Dr. Chuck Jackson, and, you know, I think you may hear many of the same views that were expressed today, but I think you will have a different spin on it as well.

MR. COLTRI: Glen, I would urge you not to make it a --

MR. NASH: Identify yourself, please.

MR. COLTRI: I'm Norm Coltri, RCC Consultants.

I would urge you to not to make it an all negative presentation or comment that you provide to the committee. But there are some definite advantages to the software radio.

MR. NASH: Oh, I agree.

MR. COLTRI: If we have one box, one hand-held unit that could be a cellular telephone, it could be a NIPSPAC radio, it could be a 700 radio all by programming, the cost of that box is going to come down significantly through the mass production of that radio, and the software to program it would be dependent upon who is using the radio at any one time.

So that if you have someone operating in the 700 band and they need to place a cellular call, they would press a button on the radio. It can now become a cellular phone. They use it for their cellular call. Go back to 700. These are all possibilities, so there are definite pluses to that technology if it's controlled properly, so I think that also be addressed in your comments.

MR. NASH: Well, I agree and if for no other reason than to tie the 11 different public safety bands together, you know, within a single radio.

MR. SCHLIEMAN: With one antenna.

THE AUDIENCE: Big antenna.

MR. NASH: Yeah.

(Laughter.)

MR. NASH: You know, there are some technological problems to be dealt with, but that's being handled.

MR. SCHLIEMAN: Yes, it is.

MR. NASH: You know, we are being told that this is the greatest and most wonderful thing. You know, can we use it. Yes, we can.

All right, that finishes that up.

The last thing on the list was report on channel width. Is that going to be a quick report, Bob, I hope, or everybody else here is hoping?

MR. SCHLIEMAN: Yes. As a matter of fact, it is a quick report.

Also, as part of my work activity, we are exploring with manufacturers the availability of various product, and based on conventional and simulcast use in six and a

quarter FDMA, 12.5 FDMA, 12.5 two-slot TDMA and 25 kilohertz four-slot TDMA, sort of a matrix of information.

We haven't got any responses back, but I think that might be very useful in terms of understanding the situation.

And also we are studying the frequency -- spectrum efficiency factor with these various options to determine at least for large systems, and I suppose for a multitude of small systems, and how they may best use the spectrum.

So that is what I have to report on that. Stay tuned for more in September.

MR. NASH: Any comments?

(No response.)

MR. NASH: Okay, I will open the floor for any questions, comments that people want to make on issues that might be of interest to the committee.

Everybody is in a hurry for lunch.

(No response.)

MR. NASH: Seeing nobody jumping up to make a comment, I guess we will move for adjournment.

MR. WILHELM: Well, I won't jump up, but I have a short announcement.

For the steering committee, there will be an informal get together at 11:00 tomorrow; if you could meet in this room, please, and we'll direct you to a conference room.

Thank you, Glen.

MR. NASH: With that, we will adjourn. The interoperability committee starts at --

MR. WILHELM: I think it's 1:00.

MR. NASH: One o'clock. So 1:00 back in this room. Enjoy your lunch.

(Whereupon, at 11:36 a.m., the meeting in the above-entitled matter was recessed, to resume at 1:00 p.m., this same day, Thursday, June 1, 2000.)

//