FEDERAL COMMUNICATIONS COMMISSION

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PUBLIC SAFETY NATIONAL COORDINATION COMMITTEE

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INTEROPERABILITY AND TECHNOLOGY
JOINT SUBCOMMITTEES MEETING

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THURSDAY,

NOVEMBER 15, 2001

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The meeting was held at 9:00 a.m. in Salon A and B of the Brooklyn Marriott Hotel, 333 Adams Street, Brooklyn, NY, Michael Wilhelm, Chair, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

MICHAEL WILHELM - CHAIR
JOHN POWELL
GLEN NASH
ROBERT F.SCHLIEMAN
TOM TOLMAN
TED DEMPSEY

ALSO PRESENT:

JOHN OBLAK
WAYNE LELAND
TIM GOODALL
DAVID BYRUM

ALSO PRESENT: (Cont.)

CLARK PALMER
DAVID EIERMAN
RON MAYWORM
CARLTON WELLS
RICK KEMPER
BOB FENICHEL
DAVID PICKEREL
PAUL MAY
DAVE FUNK
ALI SHAHANI
FRED GRIFFIN

A-G-E-N-D-A

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

(9:10 a.m.)

CHAIR WILHELM: I want to welcome you to the 13th meeting of the NCC subcommittees. When we adjourned our last meeting I don't think any of us expected to be in New York City under these circumstances.

But I heard, from the NCC members, that it is important that we be here, that we learn first-hand of the experiences of the public safety officials who participated in the World Trade Center and Pentagon attacks.

I would like to express the thanks of the Chair of the NCC to Motorola and IXP Corporation. It is only through their contributions that we were able to have this room for today and tomorrow, and the fine refreshments in back.

So please, if you see their representatives, thank them for the seats and the chow.

We are ready now to start a joint meeting of the Interoperability and Technology Subcommittees, and I would turn it over to Glen Nash.

MR. NASH: Good morning. I have to admit I'm kind of winging it here. We've got the

presentation by John Oblak here representing TIA on the -- where things are going with the wide band standard.

We've also got a request from Pinellas County, Florida, to give us a presentation about the Greenhouse project that they've been working on, which is a field test of a wide band data system.

So, John, you are going to go first? Ar, we are stalling here for -- to deal with technical issues, do a technical presentation.

I trust everyone had a successful trip here. At least you are here. Monday, when I started my trip, it was questionable whether or not we were going to get here.

CHAIR WILHELM: While we are waiting I would like to remind you that this proceeding is being transcribed. So if you have any comments, or questions, from the audience please use that microphone over on your right, and we will have a clear transcript for the Court Reporter.

And be sure to give your name, as well, when you come up to the microphone.

MR. NASH: Are you ready, John? I'm going to turn it over to John Oblak with E.F. Johnson, who is representing TIA today. They have been working on

technical standards for the wide band portion of the 700 MHz spectrum.

MR. OBLAK: Thank you very much. We, at TIA, are pleased that the NCC has requested that TIA develop the standards for wide band data for this frequency band.

We certainly have accepted the challenge, and want to give you a brief overview of where we are in the standards process, and what our plans are for completing this.

The Committee that is working on this is under the leadership of Jeff Anderson from Motorola. Jeff did most of the work in preparing these slides. However, Jeff was not able to be here today, so I will fill in for him as Chairman of TR-8.

My apologies, again, for not having set up completely.

(Pause.)

MR. OBLAK: Our agenda today, first of all we will go through a very brief overview of the NCC requirements, as we understand them; go through the TIA process and progress to date. We will spend just a brief moment on some of the diagrams of the technology, go over our progress on physical layer, and our selection process there, understand a little

bit more of what the standards suite will be comprised of, and basically our schedules, and how we are attempting to meet the requirements that are set upon us.

The statement of requirements, these are requirements that the NCC has given to us as of June of 2,000. Obviously we are going to be working in all of the three band widths that are available in the 700 MHz band, from 50KHz, 100KHz, and 150KHz channels.

The three configurations are radio to fixed network, radio to radio, and radio through a repeater to a radio. And the desired attributes that we have are basic text messaging interoperability, mobile and hand held radio support; those are mandatory, and the optionals that we are working on are ground and airborne video transmission, e-mail with file attachments, and internet connectivity with encryption.

The work products that we see in TIA, first of all, and these represent, somewhat, the areas of work that we are working on. The wide band system and standards definition. This will be a document that is kind of an overview document of the entire suite of standards.

The initial version of that, which we

intend to publish as a TSB, that is a telecommunications system bulletin, has been balloted. It has been approved by TIA, and has been approved, also, for publication as of October 1st. So that is in the publication stage right now.

Wide band physical layer specification. And, again, this is the lowest layer of the specification, it is kind of a pivotal document, as well, or pivotal set of documents.

The five total technologies that were initially proposed, of those we have decided to go forward with two of them. The two represent scaleable adaptive modulation, SAM, and isotropic Orthogonal transform algorithm, IOTA, and that is a EADS proposal.

The wide band standards suite and schedule, again, the schedule, the plan for the activity of the committee, on August we voted to accept that schedule. In other words, we were working to a very definite schedule, and that plan was developed in August and agreed to. And, certainly, TR-8 is working very hard to maintain schedule adherence.

CHAIR WILHELM: Glen, I'm sorry, you need to use the microphone.

MR. NASH: John, you are showing there two technologies, SAM and IOTA. I would presume they are mutually exclusive?

MR. OBLAK: That is correct. They are mutually exclusive. That does not mean that we are going down two paths, but at the moment we do not have a firm consensus to make a choice. We are continuing with both.

Ultimately our aim is to converge to one technology.

MR. NASH: Okay, because that becomes my concern from an interoperability standards standpoint. At some point we need to get down to something that one radio and one system can talk to another radio in a different system.

MR. OBLAK: Exactly.

MR. NASH: So we have to have a single technology, at least for an interoperability standpoint. It doesn't mean that in the general use there couldn't be multiple technologies, but we do need to have a single interoperability standard.

MR. OBLAK: That is exaCtly correct. We understand that. In the TIA process, sometimes, there certainly is a need in our process to have a consensus arrived at, and maintain a consensus process.

The fact that we were not able to reach a clear consensus at this time doesn't mean that the standard will diverge. But at the moment we are moving forward with two technologies.

In some respects it does cause a little extra work in the process. However, I think as we work toward a merging of our technologies, I think it will be a consensus driving element, rather than a diverting element.

The standards that are proposed, and there are two slides here that list a large number of documents that we see that will be, that will make up the suite of standards.

And I will just briefly go over what they are. The wide band standard, wide band data system and standards definition. Again, that is the overview document, that is the one that we have currently balloted as a telecommunications system bulletin.

The wide band air interface overview, that is just the overriding document over the wide band air interface, and it is made up of some of these items, the wide band air interface physical layer, again, which we have two proposals that we are currently working with.

The wide band air interface media access

control. And, again, this is one where we feel like we want to bring back convergence, and again, from this layer on, have single standard up for ballot.

Wide band air interface radio link adaptation layer, the wide band interface logical link control, mobility management, and the next one, packet data specifications.

And those five documents make up the wide band air interface standard. Again, where we see this as a pivotal interoperability group of standards.

In addition we have the wide band data supplemental services specification, wide band data text messaging specification, wide band data transceiver method of measurement, and transceiver performance recommendation, and lastly, conformance test.

So we feel that this is the suite of standards that will document and standardize the wide band data system.

We asked the question, what standards are required for FCC and NCC reference? What I mean by that is if you look at project 25, for example, there are some 31 documents that define project 25. And yet from the standpoint of the NCC and the FCC rules, not all 31 are referenced, or required to document the

interoperability.

We feel the same way, that not all of the documents will be required to specify complete interoperability. We see definitely, however, that the wide band air interface specifications, and those are those five subdocuments that we talked about, as well as text messaging specification, will be the pivotal documents that will define interoperability from the standpoint of the FCC.

Go through just a few diagrams. And I don't propose to spend a whole lot of time on them, other than to show you the approaches we are taking. Again, based on a wireless internet approach. You see the various layers there.

Glen, we will go to the next one, where we actually focus in on the protocol layers. And, again, I don't propose to spend a whole lot of time reviewing these, but they are available for your inspection.

The next three slides show the various reference models. In this case radio to a fixed network. And, again, we see the reference model and the protocol stack.

The radio to repeater. Again, the reference model and the protocol stack. And so we see the three modes. And, again, how they -- what the

reference models are in the protocol stack.

I would like to go over some of the work that we are currently working on. This is the layer 2, is what we at TIA are spending our most time with right now. We have several proposals for, as I had mentioned. We had five initially. Motorola with the SAM, Nortel EADS-DSN with IOTA; Marconi/Simoco with TETRA2; Comspace with the wide band DC/MA, and interoperability wireless with VMSK/2.

The Comspace and Interoperability Wireless proposals were withdrawn because of their shift in focus. They weren't able to focus on the work. Currently we have two that are, actually of the three that are considered for layer 3 proposals, and that is the SAM, the IOTA, and TETRA2.

Stepping back down in the protocol stack, the physical layer technology. We mentioned that we had balloted and are balloting two technologies in the physical layer technology.

These are a compilation of some of the characteristics of the two. And we won't spend a whole lot of time with them, other than to say that they are somewhat different and distinct.

In general the SAM proposal has fewer number of carriers than the IOTA. IOTA is a narrower

band per carrier. Different modulation schemes apply. But the net effect is a fairly similar bit rate in each of the proposals.

So, again, they are two different technologies, two different methods. The end result, I would say, there is virtually no clear winner. And that is why there was a little bit of difficulty in arriving at a consensus.

However, as we say, we are going to continue on in the process, and work toward a consensus standard. Again, more of the data with respect to the technical characteristics.

Summary of our schedule, and this is where, as I said, in August we had developed a detailed schedule on how we were going to accomplish the standardization of wide band data within the allotted time frame.

And we said we had a fairly rigorous time schedule. And this is a summary of that time schedule. In the second half of 2001, which is now, we had three activities that we needed to get done. That was wide band data system and standard definition. As you see, that has been completed, that is into TIA for publication.

TIA ballot of physical layer

specification. Again, that has been completed with the balloting of actually two physical layer documents. And technology proposals for MAC, logic layer, radio link adaptation layers. And those are all underway as well.

Deliverables in the first half of 2002. We see a physical layer TIA standard. Again, underway. We see wide band air interface overview, a bulletin, again underway. And wide band ACCP recommendations to the FCC. And, again, underway.

What needs to be started, balloting of the other documents that comprise the wide band air interface specification; technical proposals for the other layers, and technical proposals for text messaging. So those are what we will be working on in the first half of 2002.

Deliverables for the second half of 2002 include wide band MAC/LLC, RLA layers as standards, ballot of wide band mobility management PDS layer standards, ballot of wide band data text messaging specification, and technology proposals and review of supplemental services.

And deliverables in the first half of 2003, which we take that to mean the conclusion of the project, and delivery of standards. Wide band data

transceiver methods of measurement. Incidentally, those have already begun, so we are a little ahead of our initial plan; a wide band data transceiver performance recommendations, again, a little bit ahead of that plan in those areas; wide band air interface conformance, and data supplemental services standards.

So we are working very hard to maintain our schedule and to keep on phase.

The last slide, or --

MR. NASH: Again, Glen Nash, and another question, perhaps more directed to you, Michael. This would take us past the theoretical end of the NCC's charter. So how do you perceive this schedule?

CHAIR WILHELM: The schedule, I think, is somewhat longer than the FCC had considered. And as John was talking I was thinking of why, or how this schedule might be accelerated.

As far as the duration of the NCC's charter is concerned, if at the time it expires we see a need for extending it, that can be done, that has already been done once. So the NCC could stay in existence for that sole standard, the wide band data standard.

I would hope that by the time all of the rest of the work of the NCC would be completed.

MR. OBLAK: If I could address that also, please.

Again, we see that while the standards process does take us into the year 2003, it is our goal to have available, prior to that time, documents in some form that could be referenced, that could be adopted by the NCC.

So, again, we are seeing the end of our work in 2003, doesn't necessarily mean that that will be, as I mentioned, in the project 25 case, not all the documents are still completed on project 25, and yet the pivotal documents are.

And that is our goal here, is to have those documents that define interoperability, and that define the technology completed, and able to be referenced by the NCC by the time frame, again, February of 2003, that the charter expires.

MR. NASH: Now, John, that really segued into the next part of my question, or my next question. I note you are listing a lot of the documents there as being TSBs.

Under the charter of the NCC we can recommend that the FCC adopt ANSI standards, and a TSB is not an ANSI approved standard. So I guess, part one of the question is, at what point do we see those

being able to move those forward to be ANSI standards?

And I guess the second part for Michael is do we see any, you know, opening for us to be recommending adoption of a TSB and recognizing, at least through the project 25 process, is that there were a number of complaints raised about the use of TSBs, as opposed to ANSI standards.

MR. OBLAK: I think, first of all, in terms of TIA process, we use TSBs as a means of, let's say, interim work. Where we are able to publish them with not necessarily full industry consensus, and yet a majority of -- majority approval.

The project 25 suite of standards, for example, consists of perhaps half of the documents being TSBs. And, in fact, some of the documents that have been referenced, as I believe the system standard definition, are TSBs in the current form.

We understand that the mandate of the NCC is to have the process of the standards being developed under an ANSI accredited standards body, of which TIA is, and under an ANSI process, which we are undergoing.

We do believe that most of these documents will be in the form of ANSI standards, ultimately. We realize that there are some of the documents that we

propose to never be ANSI standards, there are some that can live as TSBs.

MR. LELAND: I'm Wayne Leland, I chair the private radio section within TIA. I just want to clarify a comment made by Glen. I think this came up before.

I don't think that the requirement by the FCC is that it be an ANSI standard, but it be an ANSI standard or developed by an ANSI accredited organization. So even if it is not, as of the termination of the NCC process, yet to an ANSI standard document, it can still be approved. That is my understanding of the wording.

MR. OBLAK: Perhaps, maybe, the next slide will tell you where we intend to go.

Again, we at TIA TR-8 committee are very sensitive to the needs of the NCC. We are appreciative that you've come to us as a standards making body. We feel that is a privilege, and also an obligation, and we take this very seriously.

We, by no means, want to gloss over the fact of where we are. We would like to say that there are things that we are doing that will accelerate the standards process in this arena.

Number one, that doesn't even show on this

sheet, but I believe it to be true, is that I believe that the success of a TIA committee is in large part due to the skill and abilities of the chairman of that committee.

We have, in TR-8.5 a young chairman, a new chairman, but has demonstrated extremely good leadership skills and maturity, and that is Jeff Anderson of Motorola.

I have been very pleased with his work, and in fact very confident of the outcome, knowing his dedication to this. So that doesn't appear on these slides, primarily because Jeff wrote these slides.

But I believe, number one, I have great faith in our chairman. But in addition the things that we are doing to accelerate the standards, we are meeting virtually bi-weekly in telephone conference. Jeff says at least two or more meetings, but in effect we are meeting bi-weekly.

We've developed some early starts in wide band performance and methods of measurement. These are documents that weren't scheduled to go into production, or into work, until later next year. We've accelerated the pace there, and have started work early on those parts of the standards.

Text messaging prioritized over

supplemental services. Again, looking at where the needs are for documents just to standardize the technology.

And certainly not the least of these is the reuse of existing standards, wherever possible, including the internet standards, the ITF standards, ITU recommendations, and what we can glean from project 25 standards.

So we are drawing on past work, past history. We are drawing on existing standards. And I believe that in the TIA process the standard is certainly moving forward at a faster pace than we are normally used to seeing.

And I think that is, again, because we see the urgency of the standard; we see the need to get this out in as quick a manner as we can, and yet it has to follow the TIA consensus process.

So with those constraints I believe that we are putting forth every effort to meet the requirements that you have for us. And I would be glad to take questions.

CHAIR WILHELM: John, I have one. On the narrow band side we found that the technology was available to have, for example, a TETRA radio that also could incorporate project 25 technology on the

interoperability channels.

Do you foresee this being possible with wide band data? In other words, could a TETRA-2 box be adapted to transmit according to whatever standard you establish on the wide band data channels?

MR. OBLAK: I believe that the standards that we are -- I think the short answer is yes. I believe that the standards that we are working on are somewhat a technology that is an interoperability technology. In other words, a common technology.

To the extent that, you know, other people would like to use other technologies in the non-interoperability bands, I believe that could be available, as long as they can, again, incorporate the interoperability mode within their products.

I don't think it precludes the use of dual mode radios.

CHAIR WILHELM: Do you have any feel for the feasibility of doing that from a cost standpoint?

MR. OBLAK: At the moment no, I don't. I'm not as familiar with the, let's say the competing technologies to know.

MR. NASH: To carry on, John, with that. Just considering the two technologies that you are looking at, at the moment, could those two

technologies be reasonably implemented in a single radio as two different modes which would, you know, assume -- one of them is the interoperability mode, and the other is the general use mode that somebody is intending to implement?

MR. OBLAK: I believe so. Now, again, I'll couch that in the fact that I don't know, exactly, the implementations on either side, on either party, on how they are implementing.

However, I believe that most of this could be accomplished in a common hardware platform. And, again, that is not based on any technical fact, other than just an opinion at the moment.

MR. NASH: Are there any other questions?

(No response.)

MR. NASH: Well, John, thank you.

MR. OBLAK: Thank you, very much.

CHAIR WILHELM: John, could we get a copy of the slides?

MR. NASH: The only other thing that I had was the presentation from Pinellas County on the Greenhouse, and they have asked for five or ten minutes to set up a video for us. So is it okay for us to take a five or ten minute break?

CHAIR WILHELM: Right. We had

contemplated that presentation being made tomorrow. And it is on the agenda. However, you could make it twice if you cover the more technical aspects in this presentation, and make a more general presentation, more comprehensible to the layman tomorrow.

MR. GOODALL: Tim Goodall, Motorola. I think the other thought to using the time of the subcommittee today would be to allow further discussion, and maybe possibly tomorrow, about interoperability and some of the use situations experienced in Pinellas County, and some of the feedback they have received from other organizations.

MR. NASH: So in the few minutes here, while Tim gets things set up, if people want to refill your coffee cup, go ahead and do that.

(Whereupon, the above-entitled matter went off the record at 9:44 a.m. and went back on the record at 9:53 a.m.)

MR. NASH: All right. David Byrum with Pinellas County's sheriff is here to make a presentation to us. They made a presentation a couple of meetings ago, I believe, on the Greenhouse project that they've been working on, with Motorola, in doing some field testing of a wide band data system. And he is here today to update us on how that experimental

program is going.

So, David, we will turn it over to you.

MR. BYRUM: Thank you. Good morning. We are going to do a very short presentation today, just to give you an idea of where we are in this project.

The Motorola Greenhouse project is the experimental technology proposed for 700 MHz. What we have is the first wide area, wide band system in the world. It is experimental, it is operating at 460 KBPS of integrated voice data, and the audio full duplex.

It is based on an IP protocol standards end to end, it provides internet and intranet access, it uses voice over IP based on the IMBE vocoder. Video applications using the streaming video, again, over IP.

And quality of service to adapt the various applications to different technologies within the protocol to optimize the throughput.

MR. NASH: A question here. Is this using the SAM technology and the other proposals that Motorola has made to TIA for the standards?

MR. BYRUM: Yes.

MR. NASH: So this is one of the proposals in a field environment, then?

MR. BYRUM: That is correct, this is the same protocol, SAM.

MR. NASH: Okay.

MR. BYRUM: What we have presently in Pinellas County represents a subset of a potential system. What we are testing is basically operational, and some technical parameters. It is by no means a complete system.

What it is, is that it is not an alpha or beta test, it is more of a research project being done jointly. However, it is being used by sworn officers in our agency, in the field.

Briefly, our agency has been a user of mobile data for almost 25 years, actually greater than 25 years. We are on our third system right now, and looking to move on to the new technologies, and this is the one that looks the most promising to us.

Presently our fleet of patrol vehicles numbers about 550 units. In looking toward a new system, some of our goals, and some of our desires were to have access via internet and intranet to our DL photos, which are digitized in the state of Florida.

Access to a large number of crime scene photographs, which are on line. Do crime reports, do

real time crime analysis, using the computer-aided dispatch, move as many features out into the field for the officer's benefit.

We also would like to do more GIS at the county level, pulling in maps and properly overlays, and things like that. Fire hydrants for the fire users, things of that nature. Building plans from our building department, very helpful.

To kind of sum it up, what we would like is to have everything that we could do at our desktops in our offices available out into the field, at speeds that make it usable to the user.

We have our connection to our state and federal data bases for doing personnel enquiries, driver's license, VINs, and things like that. We would like to use AVL in mapping within our agency, something we are not using presently, it quite often adds quite a burden to traditional and conventional systems.

Video has its place, we have some situations where video to and from the field would not only increase officer's safety, but efficiency. And we would like it in both full duplex, mobile-to-mobile, between two vehicles, and we would like to do mobile-to-dispatcher console.

And the voice component is always going to be there for public safety, where nothing else, there needs to be voice communications.

We are going to take a moment to queue up a very short videotape. This tape was produced to introduce the wide band technology to some federal interests, so it is kind of slanted that way. But it does show some of the operation of the equipment in Pinellas County. And tomorrow we will have this projected in the big screen.

(Whereupon, a videotape presentation was played.)

MR. BYRUM: Again, I just mention that that tape was prepared mostly for a federal audience, so it has a lot of slant that way to it. But it represents some of the video that we've captured in Pinellas County, showing various ways of using the equipment.

That tape will be available, will be shown again tomorrow, and we are going to try to project it on the large screen, if anybody would like to see that again.

MR. NASH: Dave, what kind of band width are you using for that?

MR. BYRUM: 150KHz wide channel in the

channel pairs 64, 69.

Here is a quick overview of the types of vehicles that have been equipped. I have three sheriff's cruisers with the Greenhouse equipment installed. The center is the typical patrol installation using a dash-mounted touch screen color, and the keyboard docked between the two users.

Lower left corner we have what is called a mobile unit. We took the equipment and mounted it to a roll-around cart. That is able to go into the offices and be moved around wherever needed.

We have a fire engine in the district chief's vehicle, but I didn't have a photograph to show you today. Maybe tomorrow we will have one brought in here. The ambulance in the center was a very tough install, there is not a lot of room in there.

But one of the things that we did at the ambulance level was we put the video camera on the end of a very long cable, which would allow them to take the camera out of the vehicle, take it into an accident scene, or around the back of the vehicle, sometimes where they are working, in order to send video to doctors, or any other component that has an interest in that.

The top right corner is the surveillance van typically equipped with all the video and audio recording components, and we added the Greenhouse equipment to it, located on the floor, and to the left of the chair, is the Greenhouse display and keyboard, and it appeared in the videos, previously.

Lower right corner represent a two monitor display, it is the dispatch position. The screen on the right is what is called a multimedia interface, it has the audio and video components. And on the left is the data component for CAD access, and AVL screens, which is also part of the Greenhouse AVL and mapping, not only to dispatchers, but also sent out to all the vehicles, have location information on all the other members of their fleets.

A quick overview of what the multimedia components are. There is two way video, such as a video conference, video push, meaning I can send a video component to a vehicle, I can pull video from a car. On request I can ask for that camera to send me what is within its view.

I can do one way video with a conversation going on in the background, and of course two way audio for just voice communications.

On the top box it shows one user on the

system, and on the right are the five boxes which allow you to select which of the multimedia functions you wish to enable with that user. And it is configurable by user. Not everybody necessarily needs, or has access to all the features, if deemed appropriate. It is configurable.

The lower left shows the typical query for a DL or VIN type CAD request. And in the upper right corner, presently, is a video window that is open. That window is sizable and movable. It can rotate from corner to corner and be increased or reduced in size, or eliminated completely if the information behind it is more important at the time you can turn the video window off.

The system first went operational December 20th of 2000. It really does extend the desktop functionality of our agency into the field. It is using an experimental license in the 700 MHz band, 150KHz wide channel. It is using the scaleable adaptive modulation protocol, or SAM.

That is what it is. What it is not is it is not a product, and it is not something you can buy yet. It is more of a research project being done jointly. It is not alpha or beta testing any product or device. It is, again, just gathering information

at this point.

However, it is a valid piece of hardware, and it is being used by our officers in their jobs, presently.

Quickly, the scaleable adaptive modulation trades off range for throughput. As you get in closer to your tower sites the modulation density is higher, maintaining faster throughputs. As you move further away, as signal levels and noise levels, signal levels decrease, or noise levels increase, the modulation density changes, but it maintains a quality of service appropriate to deliver the information.

Here is a quick overview of some of the numbers in the different channel widths of 50, 100, and 150KHz. And using the three different densities of 4, 16, and 64 QAM, it shows a maximum theoretical speed of 691.2 kilobits.

What is installed in Pinellas County right now is this tier right here, 16 QAM at 150KHz, and that is where we are doing our testing at this time.

Why a Greenhouse? Well, it gives us a chance to put our operational needs, the opportunity for a new spectrum, and some technology requirements to a real test. We would like to test this technology against real world standards.

We also would like our officers to help us identify how this equipment will be used, so that it can be better designed in the future to meet those needs. In other words, to build the right solutions to our problems.

Also by using standards we are hoping for quicker deployment, leveraging on what we have already in place within our agency, and our wired LANs and infrastructure.

It is a joint partnership with Pinellas County and Motorola. We are both getting benefits out of it. It also gives us the opportunity to look into the future as to what the public safety communications and data may be in the very near future.

It allows us to experiment. We've done some things using various multiple CAD systems in the vehicle. This does support those kinds of heavy applications. The video, the audio, the large JPEG files and things move quite quickly over the system.

It allows us to try different scenarios. We've done a lot of tabletop exercises in the last few weeks, and this has been mentioned as having extreme potential for coordinating events from the field back into command.

We have a number of people who have come

to look at it. What we ask is that when people come and look at this equipment they give us their opinions and input. We would like to get new and challenging ideas, and put it against the technology to see how it stands up.

Here is a sample of some of the people that have either come or expressed an interest in coming. A number of state and local public safety agencies showed extreme interest. It shows that there is a need for this in the U.S.

We have federal agencies that are interested in this technology because they are capable of operating with us in this band. A number of consultants have appeared. We have some commercial interests that have looked over our shoulder to see what we are doing.

One person that doesn't appear here is Dr. Hofmeister from M/A-COM. He came down just recently to take a look at the system and provided us some very interesting and valuable comments on how it might be used.

A quick overview, traffic stop using internet/intranet video conferencing, not only to discuss what an officer has found, but to actually share it with subject matter experts back in the

office.

Community policing, the ability to answer the community's questions by directly accessing our informational data bases, doing on-demand reports, doing neighborhood crime reports at any time, anywhere.

Crime scene, the ability not only to input information and photographs, but then to draw on those photographs back out into the field, do actual comparisons, and compare archive photos with real-time video.

The drug sting allows an observation point to capture the video, share it with command, with field units, and when the time comes to either make the arrest, or to seek search warrants. It can be done as quickly and as fast as possible by having all this information available at one time.

Quick summary, this is an opportunity to evaluate the needs of the users in live situations, and also apply the unique interoperability scenarios that we are thinking about, and talking about today, to this technology.

We have a videotape in the works right now that shows a joint operation between police, fire, and EMS. It also suggests a federal component, and we

should have that available for future presentations in mid-December.

And, again, we invite all of you to come down and see the system, bring your questions. The next tour is very soon, December 6th, but we can schedule more, if you have an interest, myself or Mr. Tim Goodall, who is working with me today, can be contacted and we will get you lined up to come on down.

And that is all I have to show you. Are there any questions?

MR. MAY: Hi, I'm Paul May from M/A-COM. Just one question. Have you collected any statistics on the use of the system that would indicate about how many users per 150KHz channel would be a decent loading?

MR. BYRUM: What we found is that the use of video does put a demand on the channel. And the question is, you know, how many simultaneous video, data, and voice conversations.

I think we have seen up to six, presently. We haven't really pushed it past that point. However, we don't see every officer needing full video, you know, on a regular basis.

So like normal public safety loading

factors, that is part of what we are trying to determine at this research level, is how many channels, really, does it take to support X number of users if they have everything lit up, or if they are just doing their normal job.

MR. MAY: Yes, that was kind of the question I was asking. For the 550 data users that you have now, do you have an expectation that you will need six channels, or ten channels, or three channels?

MR. BYRUM: I'm as anxious as the next to come up with that number, because I don't know what it is, yet, either.

MR. MAY: Okay, thank you.

MR. GOODALL: Tim Goodall, Motorola. To build on the question that was previously asked, I think it is very important to understand what would people use such technology for. It is crucial to understanding the model.

I think video provides a lot of glitz and hype, but what does it really mean operationally, and what quality of video? Because oftentimes video is very band width intensive, whereas a lot of your intranet based applications are extending a lot of wire line functionality is significantly less band width intensive.

However, efforts need to understand so that TCIP PBS applications can work most effectively within a wireless environment.

MR. BYRUM: We found, within our agency, that some of our web pages that we use in our office were very graphic intensive. And when we tried to pull those into the field we can see the load that it presents, meaning we would have to go and redesign those webpages to be more effective and efficient when deployed into a wireless environment. And that is part of learning process.

MR. GOODALL: And to build on what Dave is saying, sometimes it is just that graphically intensive because you have significant amounts of band width that are there, but in fact some of the things that can be most challenging is websites that have, could be 50 or 60 little graphics. They are all very small.

And, oftentimes, the way TCIP works, if you have to wait for one to be sent and acknowledged, then the other one, the effective user perception is it could be slower.

And so it is important to understand behind the scenes how to ultimately benefit the operation to make it usable for those participants.

MR. POWELL: Question for you. John Powell.

What are you seeing, performance wise, especially with moving vehicles, have you done any experiments there on how fast you can get going, and what quality throughput you get?

Because certainly we are looking at beyond where we are today, and moving to airborne platforms, and things like that.

MR. BYRUM: The video that I showed you today didn't have a lot of video from moving vehicles, but we do have some of that shot. I think it comes down to, also, where in the modulation density you would be.

I know in the 64 to the 16 QAM, which is the level we are working at, we've got good video up to 60 miles an hour. And, again, we have multiple windows of that running.

Does that answer your question?

MR. POWELL: Uh hum.

MR. NASH: David, this is Glen Nash. This experimental program, have you assigned, you've put these in cars. Is there a specific officer assigned to the car, or is that random draw with each shift?

MR. BYRUM: Well, I think it is true with

any agency, you have those people that reach out and try to embrace the new technologies, and you have those others that, you know, don't have an interest in this new stuff.

We found those officers that were very interested and technology savvy, and kind of focused on them. They are the ones who really go out there and beat it up.

We've put it in the hands of some non-skilled people, had a longer training curve. But we found that both have benefits. Obviously anything that is installed in our fleet would have to be usable over a wide skill set.

And, again, a PC platform in the vehicle can be modified or adopted to different levels of complexity.

MR. NASH: Do you find, when it comes time to assign that car, is it the goat that nobody wants, or is it the one that they are fighting for?

MR. BYRUM: It is that small group of officers that look forward to taking the cars out that seem to be doing most of the legwork. And I have to go drag others in, kicking and screaming, to play.

MR. GOODALL: If I may build on that response as well? For the EMS side that is the same

type of situation where it is assigned, some people are more users of it. But I would say in the fire side it has actually gone within a certain fire station, for both the district chief, and the engine.

And, therefore, it gets the users through all three shifts, and a lot of use. And that station was not picked because the skill of -- the technical skill of the users. But that is what was selected.

So everyone is actually using it out in the fire situation. In fact, one of the things that we have found is, when people start seeing the information that they can access, and the value that it can provide, whether it be building plans, what hydrants are where, and their state, and some of the uses of the video, that they actually become quite encouraged.

CHAIR WILHELM: Let me first say that that was an impressive presentation. What antenna height were you using, and what range do you get, effectively, in miles?

MR. BYRUM: The system in Pinellas county is a single transmit site omnidirectional antenna mounted about 200 feet. And we are showing a range of about six miles radius for that footprint.

MR. PALMER: Clark Palmer, Washington

State Patrol. Do you have plans on testing more than one site, multiple sites?

MR. BYRUM: If given the opportunity we would love to do that, yes.

MR. PALMER: I'm interested in seeing how your hand-off occurs between multiple transmission sites.

MR. BYRUM: Obviously a system for our county would require multiple sites. And when we finish providing input on this particular collection of equipment we would certainly love to test it in a larger deployment.

MR. NASH: Glen Nash, again. It would also be interesting, you know, from the standpoint of having interfering sites, you know, co-channel sites that are at some unspecified distance, you know, that would be acting as interfering signals, as how that would impact system performance.

MR. BYRUM: You are right, it is a very important part of the design of the system to see how it handles that.

MR. GOODALL: Tim Goodall, Motorola. I think one of the things, the questions that are raised are very good questions. And, in fact, just implementing this scaleable adaptive modulation is a

lot of nuances that are learned for what it is going to take to deploy.

That is what we feel one of the benefits is to then, also, once you have something there, live, working with users is also -- and then these other suggestions that are brought up can now be field tested, as opposed to something in a lab environment.

MR. NASH: Tim, I guess I will ask you. Does 700 MHz, is that looking like a good band to be doing this kind of thing in?

MR. GOODALL: Yes, it is. Now, I know there are a lot of issues with incumbent TV channels, and other issues that the people present are more familiar with than I.

But to have a chance to adopt the bandwidth that is there, we know that this allocation is present. And I think that one of the things that Dave has articulated is, there is real operational benefit, there is actually benefits, public safety agencies, you know, from police, fire, and EMS.

And that is what this is all about, is to provide the benefit. And so we are fortunate that in the Tampa area, that that spectrum is unencumbered, so this system is able to be deployed, and get some good meaningful feedback to see what would people do.

Because everyone has a lot of ideas of what could be done. But there is a winnowing period that you find out, through trial and error, of what really provides value to public safety officials.

MR. NASH: And I indicate, you know, six mile radius that you are getting with the existing system, for most of the public safety systems that I'm familiar with, that is a pretty small footprint. That starts to, you know, push towards what we said we didn't want in the 700 MHz band, was cellular technology.

To go to a larger footprints then you are saying we are going to have to go down to the lesser modulation?

MR. GOODALL: Not necessarily. And one of the things, there is a couple of aspects to this. One is, this is actually a certain antenna height, and actually a very lower power. And when I talk about a six mile radius, we've actually had experiences where people have gone outside the coverage area.

I had an example of an ambulance going to a different hospital which was actually in a coverage area 12 miles away. But we have not done all the statistical analysis. So that is one thing, through testing this, and also looking at the power levels,

and have the bounds between talk-in and talk-out, to go and address those concerns.

So I don't think that we are ready to say that it is a six mile radius, period. I think that becomes a function of some of the power constraints, and other technical issues that come up.

MR. NASH: Obviously increasing the power to base station could be done. But what about, you know, in the mobile, or maybe more importantly, do we see this ever getting into a portable environment, to where increased power is really not feasible?

MR. LELAND: Wayne Leland. Remember the first slide or two in here. This is not a product for sale, it is not a product that is developed, it is not even an alpha test, it is not a beta test, it is a research kind of thing.

And all of these questions are very, very valid, probably about a year too early. Because I think Motorola is still learning a lot of very basic answers, as well as Pinellas county, we are learning different applications, which is a very, very important part of the design criteria.

Because if we move beyond, you know, establishing the protocols before we know all the applications, we might miss something. So all of

these things are very valid, but I think we are probably getting a little ahead of ourselves.

We don't have access to the spectrum, we don't have a standard done. But this is research going on, and we are just trying to get answers. So all of those things are very, very valid.

And knowing the industry, and TIA, and the other manufacturers, and Motorola, when it is done, we will have the right answers.

MR. NASH: Any other questions?

MR. PALMER: Clark Palmer, Washington State Patrol, again. From the county's perspective are you documenting your back end system integration as far as data bases, attaching file photos to data bases, records?

MR. BYRUM: Yes, we do that internally, within the office, on our intra and internet already. And these devices appear just as attached terminals to our network. So all the applications and tracking that we do on our networks, this shows up right within.

Does that answer your question?

MR. PALMER: Yes. So you are not having to redesign data bases, accordingly?

MR. BYRUM: Other than for the graphical

components, you know, that is load on a wireless deployment, no. In fact, we were able to load two or three different CAD clients, one for sheriff's office, one for fire, and I believe for EMS they also did, all in one particular car.

And depending on who sat in the seat they brought up their CAD application, and they were online, which is quite a powerful capability.

MR. NASH: That brings up another question. Again, you know, the focus of the NCC here is the discussion of the interoperability applications of this. Again, recognizing it is early in your program here.

But you see much interaction between the police department, the sheriff's department, the fire department, EMS, you know, in what you are doing so far do they tend to be insular in what they are doing, or are they reaching out for exchange of information between agencies?

MR. BYRUM: Traditionally we have not had much interaction, other than occasional voice share talk groups on drunk systems, things like that.

Now that this capability is available in selected units we almost have to prompt them to think in that arena, that a first unit on the scene can send

video not only to their agency, but to other agencies.

And that is the kind of testing that we are into right now, due to the events of the last few weeks, how do we take information, first one on the scene, and share it like we never had the ability to share it before.

And that is what we are doing right now. That is why some of the video and demonstrations of that aren't available yet, is because we are presently asking those questions, what can other agency requirements be met.

MR. NASH: Because certainly one of the questions that we have struggled with is, what are the interoperability features of this new technology when we are still trying to scramble and figure out, you know, what are the day to day uses that it is going to get its most use from is, you know, how would you use it in an interoperability mode.

MR. BYRUM: Good questions, and I think that is why we are all here, to get those answers.

MR. NASH: Any other questions? David, Tim, we thank you.

One other thing I would like to move to, you know, kind of pick up a little old business here. Over the last several meetings we've had some

discussions about the encryption standard.

As many of you may recall, encryption, and this refers to the narrow band channels, encryption is not required in every radio. However, if you are going to use encryption on the interoperability channels, we wanted to set a standard for what that meant, what encryption you would be using.

At previous meetings we had decided upon, and forwarded a recommendation to the FCC that the project 25 encryption standard, which is based on DES be recommended as that interoperability encryption standard.

That is what has gone forward to the Commission, and I believe it has been incorporated into the rules at this point. Several people had raised the question that the DES encryption standard is "on its last legs". That DES is on its way out the door because it is -- it has been compromised in several scenarios.

The Feds have been working on a new encryption standard referred to as AES. That encryption, that standard has been under development now for some time, is supposed to be adopted, last I heard, will probably be some time early part of next calendar year.

In the interim there was a standard known as Triple DES that had been recommended. And, again, that was going to be balloted in TIA as a standard. That is still pending. And so at the moment, from the standpoint of being able to adopt a published standard, the only published standard is the DES standard, and that is what this committee has recommended.

Nonetheless we do have, still on our table, is this recommendation that we consider either Triple DES, or AES as the encryption standard for the interoperability channels under the argument that if we are going to adopt a standard, we should adopt something that is relatively new.

And therefore, at least in theory, would have a longer lifetime than it would appear DES is going to have in the future of LAN mobile radio.

One of the questions that I, at least, have asked the manufacturers a couple of times, and I'm not sure that I've gotten a satisfactory answer on yet, is the one that if this committee were to recommend moving from the DES standard to an AES standard, what impact would that have on delivery of product in the 700 MHz band?

And, again, I will throw that open to any

of the manufacturers that might be here. And, again, we are caught in this thing, that at the moment there is not an AES standard that we can recommend adopting, but should one come forward in the near future, is it reasonable for us to consider recommending to the FCC that they go through a rulemaking process to change the standard for encryption on the interoperability channels?

And just to kind of put some dates on it, if we were to assume that an AES standard were adopted by, say, June of next year, is that reasonable to think of, John? I refer to John Oblak. I get a nod from him. But that might be reasonable.

So if one were adopted by June, and we considered that, shortly after that adoption, and we went to a rulemaking process, and assuming the Commission were able to act fast on that, which is a big assumption, I think --

CHAIR WILHELM: Don't mention fast and Commission in the same sentence, please.

MR. NASH: I know, it is an oxymoron. But we would be looking, potentially, the rule would not be modified probably until a year from now, or later. And that puts us the question to the manufacturers, what does that do to your ability to build and deploy

product which is our bottom line requirement, of getting product on the street as soon as possible?

So I kind of throw that question out to any of the manufacturers that might be sitting out there, who are willing to tackle that question.

I don't see any of them jumping up. David?

MR. EIERMAN: David Eierman, Motorola. We have a very large base of DES users today, specially the federal law enforcement market. And, you know, if they decide to switch to AES we are definitely going to support those customers.

So, you know, obviously our plan is to eventually come up with encryption modules that go in radios that support the AES standards. So I don't know what the date is for shipping an AES.

I mean, until we have a standard, and when we have to go back through some development to make sure it fits in the modules, and into the radios. But, yes, I would say eventually we plan on supporting AES as a standard, whether it is an interoperability standard or not.

MR. NASH: Well, I guess that sort of -- you know, that you would support it. The 700 MHz band is a new band to public safety. So it is not like we

have an imbedded base of equipment out there that we need to support, this is something kind of new.

Encryption, quite frankly, for the majority of public safety is kind of a new concept. There is some limited encryption out there. But, again, encryption in general is not that widespread.

So I'm not sure whether or not we have an imbedded base that we need to support, or we are looking at something, effectively, as a new product out here, for the public safety market.

And to what extent we might need to support interoperability with equipment operating in the other bands might be open for some discussion. I guess the real question here is that there is the requirement in the rules that every 700 MHz radio be capable of supporting operations on the interoperability band.

And as I said in my opening comments, that there -- while there is no requirement for encryption on those interoperability channels, we have said that if you are going to do encryption then you must do it in accordance with a standard, and at this point we have defined that standard as DES.

And so to get back to, you know, if we were to contemplate changing that recommendation to

AES that would have some impact on radios being produced to be sold into the public safety market, and we are trying to kind of get a feel for what impact would that have on those radios; does it delay deployment of radios because we haven't -- we are sitting here being, you know, wishy washy on what the standard is going to be.

And we don't want that to be a reason for the manufacturer to say, we can't build radios because you haven't made up your minds yet. If that is going to be the response we will make up our minds here real quick.

Paul?

MR. MAY: Paul May from M/A-COM, again. I think you pointed out the most important fact. And that is that there is no installed base at 700 MHz. The first people, or the first organization that adopt 700 MHz obviously aren't going to have anybody to interoperate with, they are going to operate amongst themselves.

They may not actually need the interoperability channels. So they obviously could install any encryption that was available at the time. I also think that, you know, once you enable or enact a standard, it is very difficult to repeal it, or to

move forward from that, as people start to adjust.

So my suggestion would be that we look very, very hard at the AES standard, and see if we can make that work. Because I think that is the better way to go.

We are at the point where moving forward now, and getting to a standard by the June time frame is, I think, certainly doable within the realm of possibility. And, therefore, I would suggest that we support the AES standard, and not the DES standard.

MR. NASH: Paul, I wouldn't disagree with you, you know, that the first people in don't have anybody to interoperate. But that is only a true statement when they first install their system.

During the life of their system, as other people install their own systems, and come on line, there will be a requirement for interoperability. So the first system in needs to be able to operate in the interoperability mode.

Perhaps later in the lifetime of the system, but they still have a requirement to do it. And so that is why we've been trying to do this upfront.

MR. MAY: Yes, I'm not saying that there isn't a requirement to do it. Certainly there is a

requirement to -- for the equipment to operate in the interoperability mode. I mean, that much I think everybody agrees with.

I guess what I was suggesting was that if the first systems were going to roll out coincident with the AES standard, you know, the manufacturer of those systems could, in fact, provide some encryption capability, being DES, or Triple DES, or whatever, and not AES because of the developmental lag time.

But the -- I don't believe that the first equipment rolling out versus the standardization of AES, is going to be that close, or that far apart, is maybe a better way to look at it, such that we should propagate the DES standard as the encryption of choice.

Because I think that the time frame is going to be pretty much the same for the equipment and the AES standard. And, therefore, as you go forward in time from then, everybody will adopt the AES standard.

MR. NASH: Part of the question, then, that I would have for you, is moving from the DES standard to -- and let's assume at the moment the AES standard, in a given hand held radio, is that a software update, is that an update of the firmware

through an E-PROM change, or is that a hardware change in the radio?

And I heard the answer back there, yes.

MR. MAY: My opinion is it depends. It depends, frankly, when people design the product how forward thinking they are, and how much DSP processing horsepower they want to put in the radios.

Commercial grade DSPs are capable of doing 100 MPS, and I don't see that as a significant issue. But I would defer to somebody else who may have more experience in design and architecture.

MR. NASH: Well, what you are saying, then, is do we need to make the statement now that at the moment the standard is DES, but we contemplate making a change to AES within a year, and so therefore when designing your products take that into consideration?

MR. MAY: I guess I'm not sure how I would react to that as a manufacturer. I probably would design for AES anyway. So whether or not I got around to implementing DES would be a different question.

MR. NASH: Bob, you had a comment?

MR. SCHLIEMAN: Yes, a couple of them. First off -- Robert Schlieman, New York state.

You had made a comment, earlier, that it

was already in the FCC rules, and that is not quite correct. We've sent it to the FCC, I believe, but it is not published, yet.

In fact, as I look at 90.548 the interoperability technical standards, I note that we are still carrying some errors that were requested to be corrected a year ago.

The other point I wanted to make is with respect -- well, two other points. With respect to interoperability the 800 band is an existing band that we are operating on, and 700 potentially, in the design of the equipment, almost becomes an extension of that band.

So it is not a true statement that DES is not already in use. And irrespective of that band, I'm sure that anybody doing gateways from one system to another would, if they were federal agencies involved, they would want end-to-end encryption.

So, certainly, the DES standard that exists now, or triple DES, which exists now, could be important to have in the 700 radio right at the start.

The third point I wanted to make is that the standard that is being balloted, which will become, when it gets completed, ANSI TIA EIA 102.AAAD, lists all three as NXs, and NXA is for DES, NXB is for

Triple DEA, or the triple data encryption algorithm, more correctly. And NXC is for AES, for since NXC is incomplete at this time, or since AES is incomplete at this time, as far as being ready to be incorporated in the standard, that is merely a reference to what will be.

However, it is important to note that the Triple data encryption algorithm allows for backward compatibility to DES by making each of the three individual keys that it uses equal to the first key. The first key is set for the same key as DES, then you can use both algorithms interoperably.

There is a requirement in the NXC that was part of the issue in working the ballot process, that any radio that uses AES as a project 25 radio would be required to have a DES capable second mode of encryption incorporated in that radio, so that the DES backward compatibility would be maintained, whether it was Triple DES, or DES.

MR. NASH: I guess, Bob, my comment on that, you know, is that the task of this committee is to not come up with a standard for a radio, as project 25 was. Our task is to define the standards for operations on the interoperability channels.

And so even though the project 25 standard

may have three different modes of encryption, we have to select one if we are going to have interoperability in the 700 MHz band.

And so we get back to the question of, you know, is that one going to be DES, is it going to be Triple DES, is it going to be AES. You know, we keep arguing around the points of this, and really not coming to a firm decision.

Carlton?

MR. WELLS: Carlton Wells. We've already talked about going through this thought process of possibly considering a different encryption standard, which may cause the manufacturers to guess which one will it be, we've already adopted DES, will it be DES3, or will it be AES?

And we've said, too, that fortunately we are working with some virgin spectrum, this won't be occupied, or have any imbedded base in it when we come online with 700 MHz.

In interoperability, once we do get imbedded, and in the future Triple DES, or AES gets compromised when we evolve to the next level of encryption to get out of that compromising situation, how do we take that imbedded infrastructure, or imbedded client base and migrate it, also?

What we are doing now is looking at a static standard. But what happens as it evolves to get out of the compromising situations? If we are stuck with a static standard that doesn't have backward compatibility on our future standards that come aboard, we are going to be stuck with interoperability that is, essentially, open squelch.

So how do we adopt a standard today that tomorrow can still preserve the integrity of the communications? Adopting AES today may set us up for five or ten years of security, but after five or ten years, if it is compromised, where are we at that point?

MR. NASH: I guess I get back to the point that, you know, for the purposes of defining a standard for operations on the interoperability channels, we have to make a choice today, or in the very near future. And we can't have -- yes, there are multiple choices out there.

But if you are going to have interoperability between agencies, we have to make a choice and define what that choice is.

MR. WELLS: And I agree, we have to make a choice with the standards that are available for us to look at today. But -- and this is probably more a

challenge to the standards making bodies, what happens tomorrow when we have to get out of a compromising situation?

We are looking at a standard that is likely static. And not a standard that may be evolutionary to continue change, and we preserve interoperability as that change occurs.

So I don't know the answer myself. But just so that we understand, we are looking at a standard encryption scheme.

MR. NASH: Something to keep in mind here, you are talking about a standard setting process that has to consider migration. Here we are talking about adopting a rule, and that rule will refer to a very specific TIA EIA standard, a specific revision of it.

And without the FCC going through a new rulemaking process it makes no difference, you know, that TIA document could be updated ten times before the FCC adopts a rule update, you know, and at any point, when you are talking about changing the standard, you need to give consideration to what do we do about legacy systems, how do we transition from standard A to standard B?

I think that goes beyond what we should be considering here. We need to make the decision what

is going to be the standard for operations on the interoperability channels today, so that we can move forward with the implementation of the 700 MHz band. John?

MR. WELLS: I agree, so I think we need to look as far out in the future as we can, so when we adopt, or consider changing, that we pick something that is going to be out there when --

MR. NASH: Well, that is the argument for going AES rather than DES.

MR. WELLS: Right, look as forward as we can.

MR. NASH: Sure. John?

MR. POWELL: John Powell. I just want to comment, Carlton, that there is the old adage that if you always wait to buy the latest computer you never buy a computer.

We need to pick something that works, and from an interoperability standpoint, if we look around the United States today, we have infrastructures which is going in everywhere.

We need to be looking at the fact that the major population centers of this country are going to be able, in the very near term, to tie all the bands together. We need to be able to do end-to-end

encryption.

The largest imbedded base is at the federal level, and I think we need to look. We have several federal representatives here in the room, at their recommendations, where are they going. Because the systems that people are bidding now, state and local, encryption is part of the system.

If it is a digital system, encryption is in there. And it is just the added cost for that option is so insignificant, anymore. And the liability of not having it so high, that it is going to be there.

And we need to look at the end-to-end issues across bands; we need to look at the largest embedded base that is out there, at the federal level, and we need to make our choice.

And I would invite the federal representatives that are here to comment on what their recommendation would be. They know where their agencies are going. And we ought to follow their lead.

MR. SCHLIEMAN: Robert Schlieman, again. John Oblak, you might want to comment on this. But I believe the intent is that there is a standard, that the standard will be constant, and the changes will be

to the algorithm choice that is used with the standard when we are talking about the ANSI 102 suite of standards, as we are with the CAI.

When it completes the balloting process, and gets published, it will become an ANSI 102 standard, ANSI 102, or ANSI TIA EIA 102.AAAD. And the choice will be the algorithm, not the standard. The standard will be defined in the algorithms.

As new algorithms come along will be added in the annexes for the very simple reason of not having to change the standard, only the algorithm choice.

MR. NASH: I guess Bob, I have a question. Are you saying that we can just adopt the standard, we don't need to define whether it is DES, Triple DES, or AES, that doesn't make any difference?

MR. SCHLIEMAN: No. What I said was there is a standard, the choice we are really talking about is the algorithm to be used with the standard, or it is almost a standard, we haven't finished it yet.

MR. NASH: But I guess I get back to the question that if we are going to have interoperability, do we not need to define the algorithm --

MR. SCHLIEMAN: Yes.

MR. NASH: -- that occurs on?

MR. SCHLIEMAN: That is correct.

MR. NASH: So if we --

MR. SCHLIEMAN: I'm clarifying the words being used here.

MR. NASH: Okay. But from the standpoint of the work of this committee, we need to choose an algorithm --

MR. SCHLIEMAN: And a standard.

MR. NASH: -- the standard with defined algorithm that says, this is encryption on the interoperability channels.

And so it gets us back to, you know, really the question of at the moment the recommendation of this committee is DES. There have been some that have suggested we should go to Triple DES, because it is compatible with DES.

There have been others that have argued, no, don't do that, that is an interim thing that really won't be implemented by anybody for any reason, and that you really ought to go to AES because that is the wave of the future.

And I'm trying to get an answer of where we, you know, should we move from DES to something else, and what is that something else? So that we can

go forward and complete the rulemaking process here, to get it into the FCC rules, and so that the manufacturers can build us product which is our end goal here.

You know, we need to start deploying systems. So -- John?

MR. OBLAK: John Oblak. Just a brief confirmation that what Bob said is correct. The TIA standard that is being developed will be for all of the three -- each of the three algorithms that was defined.

Now, what TIA will not do, in all likelihood, is choose one as a recommended. These are all standards that are up to the choice of the user. And in this case I believe that the NCC being a recommendation, or making recommendations to the FCC on interoperability, will need to choose the standard, the algorithm that would apply.

MR. SCHLIEMAN: To answer your question, Glen, or at least to speak to it, I don't know if I can answer it. In the TR-8.3 subcommittee the info sec people, primarily the guys in the federal government who have the longstanding vested interest in encryption, which is something that those outside of the federal government are also making use of.

They required that the choice of algorithm should always be backward compatible to DES, even though DES has been broken. The fact of the matter is to achieve interoperability you go to the lowest common denominator.

And so the decision was made that DES would be the lowest common denominator. And for that reason Triple DES, or Triple DEA encryption algorithm can be made to operate like DES, simply by making all three keys the same.

And if a radio will implement AES when it is completed, that radio in complying with the standard, the AAD standard, would have to have a second mode of algorithm that would allow it to be DES compatible. Either Triple DES, or DES.

MR. NASH: Okay. Let's back up. My understanding is that AES is not backward compatible with DES. You can build a radio that has both AES and DES in it, that is just a multi-mode radio.

So, again, I'm trying to separate here the building of a radio, which the radio may have AES/DES/Triple DES, XYZ, 45W, whatever in it, as capable modes of operation. That is a manufacturer decision on how they build their radios.

We are talking, here, about a standard for

operation on the interoperability channels. And we need to define that mode of operation. Go ahead.

MR. KEMPER: This is Rick Kemper, CTIA. In the industry, as we went forward and implemented encryption, and authentication in our systems, a lot of this would be -- perhaps I'm just trying to say that you need to be aware that this discussion of encryption and how to do it is all very good.

But another thing you need to be aware of, and a huge task that we face, is key distribution, and key sharing. And we found that the standards did not cover this in a lot of detail, and there is a lot of operational considerations that have to be made.

So what I hear you saying is that you want DES, or perhaps some other algorithms in these radios so that your systems will be interoperable. You need to realize that you need to be sharing keys, also.

I believe DES is a private key symmetrical system. Those will also need to be interoperable, you will need to create systems so that you can share those. Otherwise the whole discussion is moot, if you are not willing, at some level, to make sure that those keys can be shared in between systems.

I mean, the capability will be there, but you are going to have to do a heck of a lot of work to

take care of the key, and key sharing, and trust issues on the operational side of the issue, and not just the technical, let's make sure what the radios can support.

MR. NASH: We are aware of that. Paul, you had something?

MR. MAY: There were a couple of issues raised in terms of backwards compatibility. And obviously that brings in the question of where do you draw the line. For example, the 800 MHz.

In 800 MHz there are a number of different implementations of DES, depending on who the manufacturer was, and the time in which it was built. And so, you know, if we say we want to go back all the way to DES XL with CDSD, or something like that, clearly that is probably beyond the bounds of what we would consider.

But, obviously, you have to draw an arbitrary line in the sand to say, okay, we are going to be backwards compatible to this level. And, again, I think that is why my suggestion is that just moving forward, because this is virgin spectrum, it is probably the best solution long term.

MR. NASH: Again, I guess I would argue, you know, no disagreement that a particular radio, and

particularly if it is 700 to 800 MHz, that that radio may need to be capable of DES in order to be backward compatible with some existing 800 system that is operating on.

And part of the question here, there is no existing legacy system, at 700 MHz, on the interoperability channels, that we need to protect its operation on in making this decision.

So at least in my mind I'm trying to separate what a radio might need to be able to do versus the decision we need to make here for operations in this new 700 MHz band.

MR. MAY: The one other point that I want to make, too, was that the encryption standard that we choose is the standard that has to be used in the interoperability frequencies, or channels, when you are encrypted.

There is no actual requirement that the manufacturers include an encryption capability in the radio, per se, right? It is just that you have this type of encryption if you are going to use it. Is that correct?

MR. NASH: At the moment there is no requirement for encrypting the interoperability channels, at all. However, what we have said is if

you use encryption on the interoperability channels, then you will do it in this standardized mode that we are trying to define.

MR. MAY: Okay, thank you.

MR. NASH: John?

MR. POWELL: Two comments. First of all, it is a standard, and my understanding is that that is the way it is. The standard itself incorporates the requirement for backward compatibility if we select AES. The standard itself mandates that backward compatibility.

Then it is going to be required if they implement according to the standard. And that is the way --

MR. NASH: John, I guess we get back to a good point that Bob brought up. Is I think we are talking about two different standards, here. There is the standards document, 102 series, that has been written, that is one thing.

What we are talking about here is what is the standard mode of operation that we are going to require in the interoperability channels.

MR. POWELL: I would suggest that probably with regard to requirements for backward compatibility, the interoperability subcommittee

should take that up. And my personal feeling is that if we have to be, because of gateways, we have to be backward compatibility to the lowest common denominator, because we will have to talk to an imbedded base.

Even though one doesn't exist at 700, it certainly exists in other bands. And --

MR. NASH: Okay. So you are suggesting we throw this back to the interoperability committee. If we do that what I'm going -- you know, take Chairman's prerogative here, is I want the interoperability committee to define a single mode of operation on the interoperability channels of the 700 MHz band.

This committee needs to know one mode that will be defined as the interoperability mode for operation on the 700 MHz interoperability channels.

MR. POWELL: We can discuss that today, and hope we come up with a recommendation.

MR. NASH: Any other discussion?

(No response.)

MR. NASH: Is there any other business for the technology subcommittee?

(No response.)

MR. NASH: With that I guess we will pass it to you, John.

MR. POWELL: And what I'm going to suggest that we do, so I can get some documents out, is that we take a lunch break right now, if that is okay with you, Michael.

Is the other subcommittee scheduled at three?

CHAIR WILHELM: Arbitrarily.

MR. POWELL: Arbitrarily, right. What about if we come back at 12:30, does that work for people?

So we will adjourn this joint meeting, then, until 12:30 and we will pick up with the interoperability subcommittee then.

(Whereupon, at 11:10 a.m. the above-entitled matter was recessed for lunch.)