ICANN82 | CF – SSAC Work Party Meeting on DNS Blocking
Saturday, March 08, 2025 – 15:00 to 16:00 PST

JOHN EMERY: We are at scheduled start time. Could you please take your seats? Please take your seats everyone. All right. Could you please start the recording? Hello! My name is John Emery, and I'm the participation manager for this session. Welcome to the SSAC DNS Blocking Revisited Work Party. Please note that the session is being recorded and is governed by ICANN expected standards of behavior and the ICANN Community Anti-Harassment policy. Greg, over to you.

GREG AARON: Hi, this is Greg Aaron. I'm the co-chair of the working party. My co-chair, Warren Kumari, is in Thailand doing IETF stuff, so I'll be your host today.

We are now at the beginning of the end. We've been working on this project for about six or so months and our goal today is to hopefully get to the point where we say, yes, we're basically done and we are ready to take the paper through the formal approval process and kick it up to the full SSAC. Over the last few weeks a lot of comments have been resolved. What we're going to do today is go through what remains in the paper and see if we can iron out any last questions, and then hopefully we'll be able to make a call

about going ahead to the next steps. Does that sound good with everybody?

I see a thumbs up. Okay. So, John, you want to… We're going to start at the beginning, and do you want to actually walk through?

JOHN EMERY Sure, yeah, I'll take us through. So, we had some discussion in our last meeting and Lyman proposed some text for the executive summary, so we want to walk through that real quick. How do we feel about this proposed text by Lyman? I could read it out, but I assume you can all read as well.

BARRY LEIBA This is Barry Leiba. I don't mind the content, but the sentence is too long. I would suggest breaking it in two.

JOHN EMERY Thanks, Barry. Greg?

GREG AARON One of the pieces that's new since the last time is the legal public policy, social and economic methods. You use technical interventions like DNS blocking to serve those purposes. I don't think that stuff is… It kind of gets off the topic a little bit, especially since we say a little later in the exec summary DNS blocking is a way to serve some purposes, and those are the purposes, so I would actually suggest getting rid of that to simplify and trim down the paragraph.

JOHN EMERY Okay, we got a plus one, So going to go ahead and delete Internet information—

GREG AARON Yeah, the whole… To the end of the—

JOHN EMERY All the way to the end.

GREG AARON All the way to the end of that sentence.

JOHN EMERY Look at us. And then, good with the last sentence as well?

GREG AARON Does that help shorten that paragraph? Barry, is there anything else you want to do to shorten that sentence?

BARRY LEIBA I would after IP addresses I would end the sentence and say, “This is done either by,” and that makes it a little less of a mouthful or an eyeful.

JOHN EMERY And then, Peter, I see you had a comment there in the document, specifically with the word often.

PETER THOMASSEN Yeah, it's unclear whether the word refers to, is it often employed or is it when it is employed, it is often done because it's easy to do?

JOHN EMERY "Is employed often," is what we're trying to say. Right?

BARRY LEIBA I think either order that you put it, it has Peter's problem.

JOHN EMERY Yeah.

PETER THOMASSEN I don't have a problem.

BARRY LEIBA Okay, "Often DND blocking is employed because it is relatively easy to implement." Maybe that's the way we want to say it.

PETER THOMASSEN I think so, yeah.

JOHN EMERY Thank you for the capitalization. Robert?

ROBERT GUERRA: Yeah, just a question at the very end, potential side effects. Do we want to put any qualifier in terms of positive/negative, or just leave it? Or add possible unanticipated side effects? Just kind of to flag that it's not just, stuff happens, it might be a problem.

GREG AARON: May cause drowsiness, please do not operate heavy machinery, that kind of side effect. We're going to go into all the things that can happen in the paper without necessarily saying, some of them are definitely probably things we want to avoid, but I think this is okay. Is it okay to keep it simple?

BARRY LEIBA: I think, in an executive summary it's fine that way. The paper goes into the details of what the side effects are.

JOHN EMERY: And I think the next sentence kind of addresses that in the next paragraph, both intended and unintended in different contexts.

GREG AARON: So if that's okay, actually, the paper is now clear all the way down to page 19, I think.

JOHN EMERY: We made a lot of progress last week. In spite of your absence, Greg, not because of it.

All right. Page 19, we had this added from Rick.

GREG AARON May I?

JOHN EMERY Yeah.

GREG AARON Yeah, so this last sentence or last paragraph of this section actually might go further down in the paper. In the second last paragraph, we say, see the extended DNS error section below for more, and then we talk more about extended DNS error, I think, here. Can we move this paragraph down to the extended DNS error section? Is that the right place for it?

JOHN EMERY I think there's only one of two options. We either put it above that last, see the extended DNS error section, or move it down, so should we just move it down.

GREG AARON I think moving it down because we talk about… The section it would go into is in the development section and we're saying this is the work that's underway, so I think it goes in the development section.

JOHN EMERY Does anyone have a page for that real quick? So I don't… Oh, sorry.

GREG AARON I think it goes down to right about page four.

JOHN EMERY Thank you. And do we have any particular spot where we want it toward the end, or…

GREG AARON Is that paragraph about RFC8914? The paragraph we just dropped in?

MAARTEN AERTSEN Greg, are you asking about the thing that was just moved?

GREG AARON Yes.

MAARTEN AERTSEN I think that's not. This is an extension to that RFC, which is being proposed.

GREG AARON All right, so we need to make that clear. Thank you. Thank you, Maarten.

JOHN EMERY There's related work underway. Do we want to say related, or is it a direct extension? So Maarten, should we say extension?

MAARTEN AERTSEN I defer this to Peter, because I just looked it up, and Peter said he knew already.

JOHN EMERY So Peter, the floor is yours.

PETER THOMASSEN Thank you. Now, I have a problem. Yeah, it is an extension, but I think it's also fine to say there's related work., so I don't mind.

JOHN EMERY Keep it simple. Okay, we'll head back up. Sorry for all the scrolling. This was the kind of main section where we had. Page 2O first. Okay.

GREG AARON What I realized is we didn't have a diagram that kind of shows how blocking works and that could be visually useful to our readers who may not be very technical for example. John, I think we could maybe touch base about, I mean, I could make something, but it'd be probably a little ugly.

JOHN EMERY Yeah, I did drop in the chat. Internet Society has quite a few good diagrams in this paper here. If we want to kind of go through that, whether we take it inside it or use it as a model, that's something we can tackle next week, but I think a diagram is always a good idea.

GREG AARON Yeah, and so, if so, we would drop that in somewhere in the first part of the paper somewhere.

JOHN EMERY Perfect.

GREG AARON Okay, so we'll leave that in there and we'll work on that. Thanks.

JOHN EMERY I'll take that as an action item, and then the next technical section that we had discussion about last week, but didn't quite reach a conclusion was domain blocking at the recursive resolver. There was a comment on essentially, where do we want to end this discussion, that we go a little bit too in the weeds in four, five and six, and it looks like Barry proposed a second one. So Barry, if you'd like to explain what you propose there in the second, and where we think we should cut off in order to shorten it a little bit.

BARRY LEIBA Right. Well, my comment kind of says that the number two is meant to replace three, four, and five, and it's just sort of collecting everything that three, four, and five says into one shorter item, because they're all so closely related to each other.

JOHN EMERY Then was the intention to get rid of six or to keep six?

BARRY LEIBA No. The intention was to leave six. If we wanted to eliminate six also, then I think we should just restructure the section because we'd only wind up having two bullets.

JOHN EMERY I think three bullets is always the ideal number.

BARRY LEIBA Yeah.

JOHN EMERY Do we have any objections to getting rid of these three and the text that Barry defined? Okay, we got thumbs up around the room. Look at this. We're cutting at least half a page.

Okay, there's this, the non-response query. There was a comment from Jim that he wrote it a bit to soften it, and Jeff responded that it needs a bit more thought going through, so if we could all take a minute and kind of read through number three here and the comments and see if anyone has a proposal to resolve this.

BARRY LEIBA I mean, I guess my first question is whether this is actually in use in the wild, because it's really abusive to whoever's doing the query and I wonder if anyone's actually doing this.

PETER THOMASSEN So the particular piece that is highlighted, the yellow, the client is at risk of blocking other domain names. I don't even understand

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| | that. If I have my laptop here, and it makes a query to a resolver that decides to not respond to a certain query, how does that block other domain names? |
| BARRY LEIBA | Well, I guess the idea is that the client would stop doing queries at all, because the resolver isn't responding. |
| PETER THOMASSEN | Oh, because the client thinks the resolver is unusable. |
| BARRY LEIBA | Yeah. |
| PETER THOMASSEN | Now I get it. |
| JOHN EMERY | Robert? |
| ROBERT GUERRA | Yeah, so what's happened in some jurisdictions, I think sometimes when one tries to access domain names that are blocked, it registers as you trying to access a domain, it puts a penalty on you, so that's where it would be used. So countries not like here, but elsewhere, where they may not want, they're just penalizing the user, and so that may be where stuff like this might occur. |

JOHN EMERY Greg?

GREG AARON So it sounds like we have some confidence that this certainly can happen, or this is the way things happen.

Geoff Huston was saying this is what would happen. Robert's saying the situation can occur, and does. I think what we're probably not saying as clearly as we could is that the client then believes that the server, that the name server being queried is ineffective. I think we need to then end the sentence there, because it's a super long sentence, and then we need to explain that basically then the client believes that name server shouldn't be queried again, and that and then, if you start asking for other names, it's not going to work either. Would that be correct to say, Peter?

PETER THOMASSEN So let me say a few things. So first of all, I think this only can occur if you have cascading resolver setups where one resolver is asking another one, and then the first resolver who is asking the other one doesn't get a response from that other one, because it is, you know, blocking with this technology. So the first result might decide, "Okay, if I have other cascading options downstream," like, for example DNS disks. There's such a DNS proxy that can have several other resolvers it asks. It might decide I'm not going to ask this one anymore because it doesn't work, I'll ask the other one. But that is not the client detecting that, it is only if you have a

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| | cascading resolver setup, so it would be another resolver detecting that and also it would not be detecting that the name server is not responsive or ineffective, it would be detecting that this other resolver is ineffective, so that language could be improved. But, I think we have already agreed that this is kind of overreaching. You can do all kinds of things to block DNS by overreaching like unplugging the ethernet cable or rendering the resolver completely unusable. The question is if we should list those things with separate numbers here. Three, doing this blocking, four, unplug the ethernet cable. Maybe we should remove four and instead have a footnote saying you can do all kinds of other overreaching things like rendering the resolver unusable, but you shouldn't be doing that. |
| JOHN EMERY | So yeah, what do we think? Should we just end it after ineffective or get rid of it entirely? |
| ROBERT GUERRA | Yeah, I think what I'm hearing is a consensus to just keep it shorter. And just saying, hey, things can happen. |
| GREG AARON | It would be weird not to mention it at all. |
| MAARTEN AERTSEN | But then the word “authoritative” name server should be replaced by the “recursive”, right? Because that's where, what the client, that's the entity that we're… |

UNIDENTIFIED SPEAKER I don't mind ending it there, but it's not just ineffective, it's harmful to the client.

JOHN EMERY So, “Is ineffective and harmful.”

GREG AARON And replace authoritative with recursive.

PETER THOMASSEN So I added some other suggested language that says it's under certain circumstances to sidestep the issue of whether it's a client or cascading resolver or something.

JOHN EMERY Okay, so proposed text. “Now, finally, the recursive resolver could be configured to ignore queries for a requested domain, as with refused and other error response codes the lack of a response might under certain circumstances render the resolver permanently unusable from the perspective of the querier. Will result in a client believing the recursive name server being queried is ineffective and harmful.” So got to work on the last sentence there.

MAARTEN AERTSEN I think the last sentence can go if you take Peter's language.

PETER THOMASSEN I don't know if anyone, if everybody likes permanently unusable, because that's quite a strong statement, and I couldn't think of a moderate version of it.

JOHN EMERY So then the proposal, then, is to leave it after that and maybe make it less strong than permanently unusable. Any suggested text there?

BARRY LEIBA Yeah, I think the mumblings from this side that are off mic are saying just take the word permanently out and let it just say unusable.

JOHN EMERY Unusable from the perspective of the querier.

BARRY LEIBA Yeah.

JOHN EMERY Short and sweet. How do we like that? We love it. Okay, let's go ahead and accept a bunch of these. And we resolved that one. Okay, moving on to the next open query discussion, and DNS blocking and recursive resolvers conflicts with DNS SEC from Geoff and Warren. A bit of back and forth. Seems like this section needs a little bit of work from the comments as well. Peter proposed a couple things in here as well, and unfortunately, we don't have Jeff here to take us through a little bit.

PETER THOMASSEN

Yeah. So maybe I can comment. This was discussed by email between Geoff and me and Warren, and there were various proposals. For some reason we didn't settle yet. Anyway, one of the questions which Geoff raised, let me step back. Yeah, so the thing that's highlighted, the pre-resolver blocking. I use the term because if the blocking is done on the resolver itself. It can just return an X domain and ignore all the DNS SEC stuff, right? So the effects of DNS SEC detecting tampering like DNS blocking happens only when the blocking is done not on the resolver, but before, like on the auth or something, or on the wire before, so I called that pre-resolver blocking. Geoff said that's not a commonly known term, and it's true. I just made it up, but I think we somehow need to make that distinction, because in the rest of the paper we usually talk about blocking on the resolver. So it's important to make the point that DNSSEC, with its implications from detecting things, is only effective for pre-resolver blocking. I don't know how to say that, but I think it's an important point, so maybe we can at least settle that point here.

JOHN EMERY

I think that's an important point raised by Peter there. It's not a well-known term. However, there's no place and time like the present to introduce a new term into the vocabulary, and so pre-resolver might be the one, Greg.

GREG AARON Another way to help the readers would be to say this is actually the sequence of events: if you make a query and there's DNS second involved, this is what would happen. You want to try to illustrate for them, and then then you could say this actually happens at this point, which is different from what we've talked about before.

PETER THOMASSEN We could have such an illustration even further on. Sorry, earlier on, where we have, like before we talk about un-resolver blocking, we could say, this is a query flow, like, you know, linear, one dimensional. Not all of the recursive stuff, just like client asks a question, goes to the resolver, and then the resolver gets something from some magic source of truth, and so we could say that you can intercept and tamper at each of those opportunities. And then, now let's talk about blocking on the resolver, which is this one here and then later let's talk about blocking on the wire, and this is where the DNSSEC thing comes in, for example. So maybe that would somehow help increase overall clarity of… It might, it might not. I don't know.

JOHN EMERY Yeah, I think I like that proposal to have an illustration that shows that general query flow, and then we can kind of show that at each stage, and then essentially put an arrow in for where it would be intervening, so that you can launch your pre-resolver blocking terminology here.

BARRY LEIBA Because one picture is worth a thousand undefined terms.

JOHN EMERY Correct. Anything else we're able to do in this section today, or is it essentially getting this illustration together?

GREG AARON I think that yeah, what we'll probably want to do is get the illustration, then look at this text one more time to just make sure that it tells you what's happening in the illustration, basically.

JOHN EMERY Okay, so I'll take an action item to work on finding an illustration that does this adequately and consult with work party members.

GREG AARON Okay, yeah. We'll try to work in the concept that Peter is talking about, which is this is all happening before pre-resolver.

JOHN EMERY Okay, so moving on, that's kind of the last main open query. We did have one suggestion here. Let's see, for the extended DNS error, who is the anonymous person that claimed 8.8.8.8 is using it and how do we want to solve for this one, Greg?

GREG AARON I guess it doesn't matter who it was, they're just noting that Google Public DNS is actually doing this, so there's a major user. In the yellow section does everybody… It's kind of, there's an endorsement here, and we say it's a significant thing and it does these things, including fostering accountability and enabling users

to make informed decisions. Is everybody comfortable saying those things?

MAARTEN AERTSEN: So maybe more of a question and an answer like the enabling users to make informed decisions. Is that actually how things are surfaced in their application? Because it seems…

PETER THOMASSEN: Okay. So—

BARRY LEIBA: Yeah, I'm with that. I don't think this is a user level thing.

PETER THOMASSEN: I agree. So not only Google uses it. In fact, I don't know if they do, but Cloudflare, the quad one does use it. I just checked and it's currently not user visible, but there's all the DoH resolvers and all of that in browsers, and if I'm not mistaken there is an effort to make that part of the UI in some browsers. I mean, we shouldn't be saying that that has been done, but at least it is on the DNS level somewhat common to be used. So that endorsement is fine, but we should take out the user level part.

GREG AARON: Yeah, I'm thinking that the only place the user would ever see it is if it was in the browser, where they get, you know, when you encounter an error code and they say actually what it is, and you might get some message like censored, or something like that. I

don't know if that rises to the level of being significant or impactful, but you can also use it in the background in other ways. Maarten?

MAARTEN AERTSEN I would propose just removing the bits from the comma and "and enabling", and then this is nice.

BARRY LEIBA Second that.

JOHN EMERY Gautam?

GAUTAM AKIWATE Oh, I was just going to say, Safari does do the surface, the extended DNS error code up to the user to say the DNS returned extended DNS error code 17, filtering, blocking, and censorship, so it does do that right now.

BARRY LEIBA Soon as you say DNS to my mother she glazes over. That's not going to be effective for users.

GAUTAM AKIWATE No, it says this was blocked by your network. It doesn't use extended DNS error code. It just filters it up to the user in a—

MAARTEN AERTSEN That would also apply to my father, by the way.

BARRY LEIBA So blocked by your network is better than talking about DNS, but still the average user is still not going to understand why. I think we should just go away from trying to bubble this back to the users in this document, and if Google figures out a nice way to convey this to users, then all the better for them.

JOHN EMERY So right now the proposal is to just delete after accountability. We have consensus there, so everyone's mother and father will be able to know what's going on? Okay. All three quads use this. Do we want to put that in a footnote as well maybe, that all three quads use this, or is that irrelevant?

BARRY LEIBA Yep. I don't know. If we're sure of that, I think putting it in a footnote would be an interesting footnote.

JOHN EMERY Okay, we'll add a footnote there. Does someone want to dig up examples for each where you can show us where that is? I'll put the footnote in there, and if you could just add the text, that would be helpful instead of me digging for random links. Thank you. Okay. Are we good to move to the appendix, or is there something?

GREG AARON I don't think we have any content for the conclusions and further reading section. I think we could probably just eliminate the head.

JOHN EMERY

Oh, so one note here. We did trim down the definition of VPN, so thank you everyone last week who participated in that to make it far more accessible.

There was one suggestion, seeing as how we only have one, two, three, four, five points here, Michael asked if it would be more prudent to list the technological or technology definitions right after the introduction, since it's so short. It could be a subsection of one just like Sec. 125 did. What do we think about that proposal, since it is truly such a short—

BARRY LEIBA

I like it.

JOHN EMERY

Yeah, there's no point in having an appendix if it's going to be one page, but Greg?

GREG AARON

Do we use proxy mediated access in the document?

JOHN EMERY

Only in the appendix. We did the definitions before we wrote the document.

GREG AARON

Right. I don't think that this should be dumped as a block because early in the paper we want people to keep reading and not get slowed down. So if there is a definition that is needed, put it at the

place where it appears. Now, I'd have to go back and look, but I think we said earlier in the paper, when it came up, we said what a VPN is. Resolver is a term that the non-technical need to know and we do use. We could drop that in in the right place. A policy implementing resolver is a long word for a concept we don't… Again, I don't think we use those exact words in the paper. We do talk about somebody who's running a resolver decides what they're going to do, but I don't think we use that term.

JOHN EMERY We do not.

GREG AARON And open resolvers, we do define those earlier in the paper, because we talk about some examples of them. I think this material needs to get redistributed and some of it might just go away.

BARRY LEIBA Yeah, I'm with Greg on that. When we get down to just three or four things, just define them where they're first used.

JOHN EMERY Okay, I'll take an action item, then, to probably get rid of these two, proxy mediated access and policy implementing resolver, seeing as how they're not mentioned anywhere but here, and make sure that we have this kind of condensed definition of a VPN and resolver and open resolvers where it first appears in the paper, because I agree. Given that we're down to three, no need for an

appendix and no need to put it at the beginning so that people's eyes glaze over. So that would be it, and we still have a bit of time. Is there anything else, Greg, that you want to focus on at this time?

GREG AARON

Okay. So first, assuming we take care of these last little bits, which are more housekeeping than substantive, I'd like to ask the members of the working party if they feel that we are ready to kick this up to the SSAC as a whole as a proposed draft. If you're in the working party, and if you feel like we're ready to take it to that next step, could you raise your hand? Peter?

PETER THOMASSEN

I think almost, I think we should settle this DNS SEC section, but we need Warren and Geoff for that.

GREG AARON

Okay, yeah, but assuming we get them to do that.

Okay, looks like we have general consensus that we're basically 99.5 percent done. Here's the process that SSAC uses to take things through the publication process. Next week nothing will happen. The staff is off because they've been working very hard at the meeting here. The week after that we'll have an opportunity to take care of this housekeeping, these last bits, resolve the last questions. Then John will help us put a number on this paper, and a final comment-free draft. Then the process is we send it up to the full SSAC as the formal comment period. They've seen an early look, so we hopefully got a lot of the important comments out of

the way, but this is a formal week process where we say please read it, make any comments you have, and basically we'll see what we get. Usually, almost inevitably, there are some notes that we need to go through and make some more changes, and then there's another period where we say, “Okay, here's the revised version. Speak now or forever hold your peace,” and we have basically a consensus call of whether we're ready to go. This paper does not contain any formal recommendations like to the board or anything, so there's not that kind of a conversation we have to have, so basically in probably April, hopefully, we get through the process and we have a final draft that the SSAC has approved, at which point it gets published, and so forth.

This will give people in the community some time to read it because we will want to talk about this paper and probably make presentations about it at the next ICANN meeting in June, in Prague. One of the audiences that we want to present to is the GAC, because the audience for this paper includes policymakers and people in government and so forth. We are going to be reaching out through our staff members to the GAC because we want to get on their agenda and see if they want to receive a presentation about the paper and then we'll make presentations in our usual SSAC meetings where we talk with the community.

We should start thinking about if there's anywhere else we want to send this paper or people we want to tell about it, or any other groups. We can always reach out to the other groups in the

community and say this new thing is coming out. You'll have time to read it, and then we'll be happy to spend time with you.

PHILIPPE FOUQUART: If I may, Philippe Fouquart, from the ISPCP. We'd be delighted to have a presentation on that topic, please. Thank you.

GREG AARON: Okay, thank you, Philippe.

JOHN EMERY: If we can take that out as an action item to present at ICANN 83 there as well. So that's the agenda going forward. Anything else you wanted to add today, Greg?

GREG AARON: Wanted to open the floor to any comments, questions? Maarten first.

MAARTEN AERTSEN: Yeah, maybe a process question. You just mentioned one of the intended audiences of the paper is policymakers, and I was wondering if anywhere during the process you want to ask one or two to read the document and to flag any terminology or other things that make it hard to get through for, like, not ourselves. Is that something you have considered?

GREG AARON: This basically a sanity check? We could. Well, if we find somebody, a couple of people basically to bounce it off of, for example, we

could do that at the same time, later this month and in April, before we have the final drafts that SSAC has to check off on.

MAARTEN AERTSEN: Yeah. Yeah, I was hoping to do something similar for the other work party.

JOHN EMERY: Peter, did you have an additional point?

PETER THOMASSEN: Sort of. I don't know if anyone has heard of Wallbleed. That's a vulnerability that was recently discovered or published in the Chinese firewall, and essentially researchers for two years exploited some memory handling issue and exfiltrated stuff and reverse engineered how that firewall works, and of course it does DNS blocking. I'm not saying we should include any of that in here, and I also haven't read the paper, so I don't know specifically if there's anything that we could benefit from. But if anyone has read the paper, it would be interesting to hear if there's something in it that would be beneficial for us to consider. Just want to raise the point. And if there's nothing, it's fine, too.

GREG AARON: Do you have a reference that we can look at?

PETER THOMASSEN: Yeah, Maarten did put it in the Slack. I put it in the Zoom chat, too.

JOHN EMRY

If someone wants to take some homework and read through this, I know we're all extremely busy this week, but see if it would be worthwhile including in here given that it is such a recent and important paper. Any other comments or questions?

I do want to say, thanks for everyone showing up today. It might not have been the most exciting to see how the sausage gets made, but I hope at least we piqued your interest to come, see the kind of finalized product, and read this paper, and especially the presentations at ICANN 83. We did make it accessible to a more general audience, and this is something that a lot of governments are doing globally. It's a very important piece that I think we were able to get through in a very short period of time, especially for an SSAC publication, so thanks to both Greg and Warren and the entire team for really working hard to contribute text on this. We're almost through the final bit.

GREG AARON

Yeah, and I'd just add to that this has been a very smooth working party, actually. We tried to see if we could get stuff happening in the document and asynchronously, and so forth, and a lot of people pitched in with text and with comments, and I think the text has benefited from the SSAC members who have expertise and good thoughts about this actually drafting stuff, because they've helped make the comments or helped make the material come out. It's also ended up, I think, at a level which is not too technical and is appropriate for the audience. As technologists we tend to

think about all the implications and all the corner cases and so forth, and in some cases I think people were willing to cut stuff which simplifies things, while still remaining accurate. I think everybody really paid attention to the audience of the paper. I'd like to thank everybody for everything they did. It was it was really a nice process, and I thought everybody worked together really well, so thank you so much.

JOHN EMERY All right. Thank you, everyone. We'll go ahead and end the session. If you could please stop the recording.

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