MONTREAL – GNSO - RDAP Working Group Public Outreach Session
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RICK WILHELM: Very good. Thank you. Wow. It's like my ESPN is working. Good afternoon, good morning, good evening, everyone. Today is November 4th, 2019. Welcome to the RDAP Working Group's Public Outreach Session from ICANN 66, here iN beautiful Montreal. My name is Rick Wilhelm. I'm from Verisign. I'm the Chair of RDAP Working Group. Here on the panel with me today are some of our panelists. We're going to go down the line and have them each introduce themselves. That will give you a chance to hear their voices, and less chance to hear mine, and also give them a chance to give a little bit about themselves. First, Quoc, please.

QUOC PHAM: Hi, my name is Quoc. I'm from Neustar, the domain name registry backend provider.

JIM GALVIN: Hi, I'm Jim Galvin with Afilias, and also a domain name registry provider. Did you want us to say a little bit about where we're coming from? Just part of the RDAP work since the beginning, and just pleased to be here to continue promoting it and getting more people on board. It's certainly an urgent thing for all of us to be concerned about, so thanks.

JODY KOLKER: Jody Kolker from GoDaddy.

SARAH WYLD: Hi, I'm Sarah Wyld. I work with Tucows. I do policy and privacy work at Tucows, and I'm an alternate for the EPDP and Registrar Team. I'm participating in the implementation for the Phase One recommendations from the EPDP, and I love this RDAP working group.

RICK WILHELM: Not sure about the sincerity of Sarah's last comment, but she's generally a very sincere person. Not generally—very consistently a sincere person. So, we're going to flip. Thank you for the introductions there from our panelists. I think that's Reg on the end. She's not a panelist she just likes to hang out with Sarah, because Sarah's fantastic.

We're going to go ahead and flip to our slide—our one and only slide. This will be burned into the screen by the time we're done here. This is a rough structure, and a set of topics, and maybe some things to get you thinking about questions. Just to give a little bit of background here, the RDAP working group is responsible for the construction of the RDAP gTLD profile.

What the RDAP gTLD profile is, is manifest as a set of documents that describes the way in which RDAP is implemented in the ICANN gTLD context. RDAP itself is documented in a series of internet RFCs, and those are published. Somebody who's quick with their fingers will be

able to type some of those RFC numbers into the chat room, but your favorite search engine would be able to put those up. Those RFCs are structured in such a way that it leaves it a little bit open ended, and provides some opportunities from implementers in particular contexts to adapt RDAP into particular needs.

Therefore, what's needed is something called a profile for implementation, and that's what the RDAP Working Group started work on a while back, and in February of this year … I think it was Feburary. Is that when we published the profile? Sarah says yes, so it must be true. We published the RDAP profile, and that is what is currently in use as of the RDAP implementation requirement, which went into effect during August of this year. Feels like the 26th—getting the nodS down the line—August 26th of this year. That governs the way that the RDAP—the protocol—is implemented in the gTLD context.

It bears mentioning that RDAP is implemented in other places. For example, the internet numbering registries—so-called RIRs—also use RDAP, and they have their own profile, which makes sense in their particular context. The one that this working group put together … By the way, the working group is much bigger. These are just some of the very active members here. This working group documented the RDAP profile for gTLDs. It is reflective of gTLD policy.

One of the things that was interesting—and maybe this is a good spot for us to start—is how some of the work … I'll just throw this one out there to see who wants to grab it—how some of the work in the gTLD RDAP profile—how we had to change some of the work and process due

to the Temporary Spec. Anybody want to take that? Sarah, is that in your wheelhouse?

SARAH WYLD: I have two examples right here. As Rick said, we've got this profile. One example is Section 2.7.4, which is about redaction. This provides for redacting contact information from the registrant, admin, tech, or other contact. It used to be, that was required to be published. Now that can be redacted. Another example is the next section, 2.7.5. This is the email field. So, it allows that the value of the email field can be either an email address or a link to a web form that can be used instead of the real email for the contact. So, that's a difference that is also from the Temp Spec.

JIM GALVIN: I'll build on Sarah's change about the email address in the Temp Spec. One of the other things that's interesting is that's a registrar requirement that changed the email address to instead display some other mechanism for contactability of the registrant. On the registry side, you just eliminate it altogether, and it's not part of it. It's totally redacted on the registry side. So, there are some other little distinctions between the registry and registrar profiles like that, that fell out of GDPR, and they were included in the Temp Spec.

RICK WILHELM: Very good. Other comments related to that? Not right now? Okay, but I think that Jim brings up a great point there. So, just to highlight for everybody that this is all work that was in process within the RDAP

Working Group. Temp Spec was issued, and the profile, which is reflective of the policy, had to change in order to pick up those changes in gTLD policy. That's one of the things that's been underway.

Related to that, I mentioned the RDAP deployment that's been underway. This first started out as a pilot program within the Registries and the Registrars. Anybody want to talk about their work on their pilots? Maybe, Quoc, or Jim, or Jody—you guys want to talk about your pilot at all?

QUOC PHAM: Yes. With our pilot, we got out our service as quickly as possible, just so people could use, but no one really knew it was there. Because it's not a mandatory requirement for anyone to access it, we got very little usage and feedback from it, besides internal users and our own developers. Through the policy development, we've found that things getting redacted, people need to be able to get access to information that they couldn't get before.

And also, on top of that, the UAM—the Universal Access Model that was raised really early on … We decided to go ahead and explore different authentication methods, to allow people to go in and do authenticated queries. What I mean by that is to be able to go in and pull back full, unredacted details. So, through our pilot journey, that's what we did, and we're here now.

JIM GALVIN: I guess I'll just add … The pilot was interesting when we first started doing this, because it actually raised some technical issues that had really not been considered before, and in fact, raised some potential issues with the RDAP standard. We're going to get down there into talking about IETF impacts on this later on.

For me, I guess I'll just add one element, in addition to what Quoc had said. There was a notion of the issues that we ran into with jCard, and using jCard as the underlying object representation. It didn't really align, and it doesn't align precisely with contact objects as defined by the EPP XML standard.

That situation actually still exists. There's still some issues there that have to be resolved, and that's on the list up there about IETF interactions—TBD impacts—in the second column. That's actually a work item that will have to taken up and brought from our pilot into the IETF process, where that issue can be addressed and resolved. That's just one example.

It was interesting to be part of the pilot—to find the details that you often don't see when you're just looking at policy and thinking that you understand it all. It's interesting to discover those little things that you don't. Thanks.

RICK WILHELM: Very good points, Jim. Nothing like having to get code running to exercise a specification, as a lot of folks in the room know. Just as a

reminder, if at any point folks have a question, certainly feel free to come to the mic and bring that up.

Jim, you brought up a comment about the jCard. This is actually one of the more—somewhat trivial, but also somewhat more material things that happened during the pilot and RDAP profile development process. Jody, can I flip that one over to you? Can you talk a little bit about this jCard situation, and what we ended up having to do there?

JODY KOLKER: Sure. Part of the RDAP profile was … What was required by the ICANN specs was a country code was supposed to be displayed instead of a country name. The jCard doesn't support a country code. Because of that, a new RFC was opened in IETF to cover that part, but there was also a problem, as Sarah talked about, where an email address could have a URI in it—basically, a URL that would point to a form where someone could request the actual email address from that.

Those two parameters weren't included in jCard, so what had to be done was that I think Scott Hollenbeck and Roger Carney started an RFC in IETF to add a country code and a contact-uri, I think it is, into the jCard, so that we could actually support the RDAP profile that ICANN needed.

RICK WILHELM: Yep, very well put. It was an interesting ripple, because this jCard and vCard standard had not really moved at IETF in quite a while. My recollection is that when Roger and Scott were working on this, they

actually had to poke around inside the IETF to try and find the right people to actually do the reviews, and get the approvals, and things like that, because the standard was so stable that it actually hadn't changed in several years.

However, this interesting change where the IETF standard was being used in a very new context, and reflective of some particular policies within the gTLD space, related to these requirements, one which has been a relatively longstanding situation within ICANN, related to country name, relative to, instead of ISO 3166 country codes … I think I just pulled a muscle in my brain. Don't ever let me say that again, Quoc, 3166. And then, the email address URI, which is a very new requirement, and had to actually write an internet RFC, and get that shoved through the IETF process in order to accommodate this policy change.

But this is one of those things, as it's said … It's similar to the old saying in architecture and engineering that form follows function, whereby the technical standards evolved to support the policy that was put in place in an appropriate fashion, and did so quite rapidly, thanks to the good work by Scott Hollenbeck and Roger Carney. That was a very interesting situation that we had.

That's what we mean when we talk about the IETF interactions and impacts—them being minimal. Surprisingly, the IETF standards themselves actually didn't require any other … The RDAP standards and RFCs didn't require any changes, really at all, other than that, is my recollection. I think we found some errata—a few minor editorial things—but the technical standards held up surprisingly well.

Maybe we could talk for a minute about client-side impacts, and some clients that we saw develop during the RDAP rollout process, and maybe also start to looking forward-looking around clients. Anybody want to talk a little bit about client-side stuff? Anybody want to take a whack at that one? It's the enthusiasm displayed by the panel that sets them apart from all of the other panels you've seen this week. That's the great thing that I love about this panel.

JIM GALVIN: I think that we're all in a place where it's interesting. I was just looking down the list, and realizing that we're all server providers. It's interesting. We're missing the one guy who has done the most work on the client development, and that was Marc Blanchet who went through the process—quite a detailed process, too. I have to say, he did a wonderful job creating an app to do RDAP queries. He put a lot of time and effort into going around, and actually taking the registry that is at IANA—the IANA Registry of RDAP Base URLs—and started making his way around to all of the RDAP servers.

Mark's a very bright guy, so he was being very careful, and true, and faithful to the standards. So, naturally he noticed all of the absolutely little things that … Nearly everyone had, I think, one thing that they didn't quite do right in what they had on their servers. But he created a document, which is currently a standing document in the RDAP Working Group. It's actually and internet draft. For those who track the IETF, there's an internet draft in which he collected all of this stuff—at

the moment, collected works. But we're all better for it, I think, is the important thing.

RDAP is a different client interface than WHOIS. Although it's possible to use … Really, it's possible to use any browser to make an RDAP query. It is true that it requires a certain amount of user expertise, in order to create the proper URL to make an RDAP query. You will get a response, and any browser will show that to you. The formatting and the look of that is quite varied, so there's some client work that has to be done.

Marc did really an exceptional job in pulling all that together, and he made all of our severs better for it, for what he did. He certainly has set the standard for what clients really need to consider and need to look at. So, I think that's what I would say. Hoping to let anyone else add to that, if they want.

QUOC PHAM: Yeah, Marc did a great job, but also a few people have done a few things that was also quite interesting. Gavin Brown, which isn't here today, he developed two client-side toolkits, maybe, if you can call it that—one in Perl, if anyone here wants to code in Perl, and one in another technology, which I can't remember. So, publicly available. Anyone can grab it today, and download it, and see if it works on their system. If you're developing a public interface, or even an internal interface that you might want to talk RDAP to different registries with, that's there.

And also ICANN, back in Kobe, they demonstrated using [RDAP.guru], which is a publicly-accessible website that talks RDAP to any registry. That's great. And the more well-formed site, lookup.icann.org … again, it doesn't have one word about RDAP on there. It just says, "Put your domain name in, and we'll return you the results that we know of." Those are examples of client-side development using and talking to us in RDAP, which has moved along quite rapidly in the last few months.

RICK WILHELM: Thanks, Quoc. Good comments there. Into the chat, if anybody's monitoring the Zoom Room, while Jim and Quoc were talking there, I pasted the link to the Blanchet internet draft, and also the link to lookup.icann.org, although that's a pretty easy URL to remember, if you're not looking at the chat. I would encourage folks to go there. One of the things that it really delivers on the promise of is a spot for centralized access to gTLD registration data in real time.

And it's through the various versions and iterations of this that ICANN has produced, and it's really matured over the past several months—over the summer, really. Now, you can type a name in there, and it will go and figure out which TLD it is, hit the right RDAP server, and even go and access the correct registrar servers to dig data out of those RDAP servers, presuming that there's availability on all of those. So, it really stops the end user from needing to know where all of the individual WHOIS interfaces are.

It's a really nice piece of work by ICANN, taking advantage of the technical capabilities that RDAP has memorialized—the technical

advances that RDAP offers over WHOIS. So, it's some very good stuff. Any other comments on clients? Yeah, Quoc, please go ahead.

QUOC PHAM: Just very quickly, the Marc Blanchet app is called RDAP Browser. It's available on iOS and Android, so you can download it now.

RICK WILHELM: Yeah. It's just that simple. I think he dominates the categories of RDAP browser. I think he's ranked number one.

QUOC PHAM: No reviews yet.

RICK WILHELM: I don't know if he's got any reviews, but maybe by the end of this session he'll have some five-star reviews. We'll see how that goes. Marc has had his app out there for a while also, and such. Folks should certainly take a look at that. It also goes without saying that right now, all of these RDAP tools are putting back whatever data is currently publicly available as per policy for the particular type of query that is coming from the public, in whatever policy is applicable for that TLD. So, that's an important thing, is that RDAP doesn't change what data is returned. It's just a different means for that data being returned.

Let's pivot over to some future-looking stuff, maybe. We talked about how the RDAP profile had to change from some of its original

development and incarnation, prior to its being published in February, and it's been stable since then. We've been keeping track of minor editorial things that we want to clean up, but really there's not been a version issued. One of the things that maybe we could talk about are some things that we see on the horizon as possible future iterations for the RDAP profile. Anybody want to take a stab at that? Sarah will take a stab. Please.

SARAH WYLD: Yes, hi. There are some minor changes coming soon, and that is for the potential or expected RA and RAA amendments. This is just adjustments to the profile, so that it can be interested into those contracts normally. More interesting to me, there are broader changes coming in response to the implementation of the Phase One recommendation from the EPDP. That's the Expedited Policy Development Team.

Specifically, we've got the administrative contact. This has historically been a part of the domain contact set, and that will be deprecated entirely, so we will have no more admin contact. The tech contact will be significantly reduced, so it will be only a name, phone number, and email address, and it becomes optional instead of mandatory. So, that is a significant change.

Phase Two for the EPDP is in progress now, so there will be more changes coming out of that. As Quoc touched on earlier today, we're working towards a system that will use RDAP as part of this data request and disclosure process. So, that means that there will be more work for

us to do once those requirements are a little bit more formalized. I'm happy to discuss or take any questions.

RICK WILHELM: They're building them up. Stay tuned. Do you feel the tension building? I feel it building. Yes, those are good points, in particular on the EPDP Phase One—the expected deprecation of the admin contact, and flipping the tech contact to optional and shrinking its size, for lack of a better term. Those are all going to be interesting changes, which will affect RDAP output.

Neither of those two will affect the form of the queries that RDAP accepts, so the query syntax and query mechanism will all remain the same. This will just affect the form of the outputs that come back from particular RDAP servers. Now, the stuff coming for Phase Two, expected to be much more substantial, obviously the policy's not even drafted, much less defined.

SARAH WYLD: Right. There are building blocks that are being worked through right now, and we'll come from that to a policy. We don't have a firm understanding of exactly how this system will work. Will it be a web portal? Will it be RDAP queries that are authenticated? It's really still in progress right now.

QUOC PHAM: This is not a policy update, but within the policy itself, it focuses on very specific RDAP query types. RDAP itself has a vast amount of types of queries and functions that it can handle. So, I'm not sure that will ever find its way inside the policy, but there are advanced features of the protocol that are yet to be defined, or yet to be agreed on how they're supposed to work.

Potentially, they don't belong in a policy update, because it's a technological choice on if you want to allow advanced searches and complicated queries to happen on each of our respective backend servers. It's a decision that we need to make. So, if you do have a need to go to sleep tonight, and want to read RDAP RFCs and profiles, please have a look. Understand that that is the range of how far RDAP can go as a protocol, but from the profile itself, what is published in terms of policy is very specific, with regards on what we need to deliver—what we must deliver.

RICK WILHELM: Thanks, Quoc. Good comments. You bring up a good point. The place where RDAP and some of the technical standards are developed are over in the IETF, in the Registration Extensions Group. There are a variety of advanced features that are underway. Jim, do you want to talk about any of those advanced features, or is that worth mentioning what some of those might be?

JIM GALVIN: I guess there are probably two which are worth mentioning, unless you have something else is your mind that I might be forgetting. One, of course, is searching. That's an important construct. The base RDAP protocol doesn't actually define how to do searching, per se. The important thing to note is that what it provides is a way to do an exact match lookup on a few key things—a fully-qualified domain name and particular entity IDs. It allows you to do that.

The notion of doing what is commonly called a reverse lookup, where I might want to take the IP address and look up the name servers that go with it, that's a reverse lookup. There are just issues there with that. Also, because RDAP has … It's now structured data, is a way to think about it. WHOIS is just a flat dumping of a response to you. With RDAP, it's now structured data, the response.

And so, you get to think about questions like, "Should I be allowed to do a lookup on any element that might be inside that data. Since I now can easily name it and identify it, is that something to consider?" The RDAP spec doesn't speak to this issue at all at the moment, but this is a work item in the IETF Working Group.

And then, the last part of searching, which is interesting, is whether you do partial matches or not. The common thing that people are used to is you put a star at the end of a prefix of something, and it will match anything which has those first few characters. You can get very creative from that point on. In computer science, you have something called regular expressions, and there's all kind of interesting stuff that can happen in that case.

But whether or not the protocol even has a syntax for those features is one issue. And then, there's the issue on the policy side, in the ICANN arena, about whether or not you're going to require support for those features. Those are two steps that have to happen there. So, searching is a fairly significant work item, which is just getting started in the IETF, and we'll see where that goes.

The other one that I would mention is a whole discussion about credentials, and what kinds of credentials that RDAP will work with, and how it will work. There is principally, right now, the OAuth standard. It's a document—an open ID standard—using the OAuth protocol. So, it's a federated system, much like the Google login that works everywhere, Facebook login that works everywhere for people who aren't particularly … If you're not technically into all of the details, that's essentially what this system is.

That is a proposal at the moment for how to support a credential system that RDAP is ultimately going to need. That work is actually on the shelf at the moment. It's in pause mode. There's a proposal with that one document there, but we're not actually doing anything with that at the moment, because we're kind of waiting for the EPDP to come out with a little bit more stable advice on what the future looks like. A little hard to experiment on a technological solution when you don't quite know what your requirements are going to be. So, a little bit of a timing issue there, in even having a standard to decide what that is.

There might be other choices that come about. Once we know what the recommendations are, and we can think about what solution we're

really in need of, then there'll be a discussion about that particular issue. So, those are the two things that I think are significant technical issues—work items in the ITEF, with respect to RDAP. Thanks.

RICK WILHELM: Thanks, Jim. I think those are great points, and getting nods from down the line. A couple things on the searching … One of the things that I recall from when … Right now, some of the searching work is a little bit being held up, ironically, at the IETF due to some privacy considerations, which is something that's a little bit grin-inducing to say, when we're here at an ICANN meeting.

And then on the credentialing, there's different other credential models that may be considered for different types of access, depending on the different types of use cases. So, as Jim noted, while OAuth is one model, depending on the policy turns out around what types of entities might be allowed what types of access at what type of frequency, there could be other types of models that might be more appropriate than OAuth. And so, the technical community is waiting for some of that to settle out on this. So, that's a great update on those items there.

One of the things that we have seen, we have seen pretty good deployments across the Registry and Registrar community. While some of these things, from a longer-term point, haven't really been decided … We talked about the authentication model related to Phase Two, and some of the other things.

One of the things that is interesting, that it's important for our listeners here and participants to be aware of, is that while a lot of these … If you're considering coming in from the client side and building towards standards and things like that, there's a lot that is settled, that you can start to be making implementation movements to build towards, if you're thinking about building some clients.

Maybe that's something that we could have a little discussion on, because as we mentioned earlier, when the EPDP Phase One recommendations come in, the query syntax won't change. The output will change a little bit. And so, maybe we can talk a little bit about where … If people are looking at things to interface with RDAP, where is that solid ground now, that they can start to build towards from a client side?

At ICANN, a lot of people are interested in getting a hold of data. And so, if they're building tools that get this data in an automated fashion, where can they start to build towards, and where's the solid footing from a technical standpoint? Anybody want to comment on some of that? Jody will take a shot. Go for it, Jody.

JODY KOLKER: Yeah, I'm expecting my panelists to keep me honest here. Some of the things that you can start to program on a client would be, obviously, looking up the domain name. Looking up a domain name should always return you at least a create date, an expiration date, a registration date, a registry expiration date for the registries, and a registrar expiration date for the registrar, if you look at a registrar.

Things that you won't be able to get, because of the current RDAP profile that's being redacted, is first and last name of the registrant—any information related to the registrant, actually, except for country and, I believe, state. Was that right? Country and state is all that you'll be able to get back for a registrant. You won't be able to get a phone number, or a fax number, if anybody still uses those.

SARAH WYLD: I want to give a caveat to that.

JODY KOLKER: Sure, go ahead.

SARAH WYLD: If I could jump in with a caveat, this is mostly correct. Typically it would be redacted, but there are requirements in the Temp Spec and in the policy coming out of the IRT, which is not yet required, but we know what's coming because it's in the Temp Spec. There's requirements that a domain owner must be allowed to consent to the publication of their data. So, a registrant contact set should still have all the same fields that it currently has. They might be redacted, but they might real information, depending on how that person wants their data to be used.

JODY KOLKER: Thanks, Sarah. That's a good point. I would also caveat your caveat. If you go to a registrar, most likely a registrant can provide consent to the

registrar. So, if you do an RDAP lookup at the registrar, you may be able to get the full contact back, if they provide a consent, but I would doubt that any registry will display any of that contact information based on consent that was gained by the registrar, just because the registry doesn't have a contract with the registrant. I wouldn't expect to have that. I think that's all I …

Well, administrative contracts … Yeah, I would stick to the registrant contact. That's about all we're going to have, since the administrative will be gone after the EPDP is gone, and the billing contact will be gone. The only contacts that will be allowed in the technical contact, or that we will be gathering, I believe, is the name, phone, email. Thanks.

QUOC PHAM: I'll just add one more to it. Quoc here for the record. Just add one more thing to Jody's comments. You always receive delegation details as well, and [not sure] if the name is actually in DNS or not. That thing will remain consistent.

JIM GALVIN: You asked about advice for client developers, as you're thinking about what you're doing. It occurs to me to call out a particular thing for client developers to be thinking about. That is where to direct your RDAP query, and the bootstrapping problem. It's useful for people to think about that, as you're looking at that kind of thing. I had very quickly mentioned it earlier in one of my responses, and I didn't see any eyes

glaze over, so I figured most people knew what I was talking about, but I'll spend an extra minute here saying what it is.

You want to make a query of an RDAP server and the question is where do you send that query, and how do you make it come into existence? It's not in the same place as WHOIS. Everything has moved, so the world really is different in that respect.

Even in WHOIS, that kind of information just existed, and it's been around for so long, we all kind of know what it is, although in reality, that question was never really standardized in an answer for WHOIS, either. It was amongst gTLDs, in the sense that there was a desire for there to be a particular domain name that would have to be known with respect to where your WHOIS server was. The registry would have to configure that, but it wasn't generally available to the community in any easy way.

With RDAP, there is a … Base URL Registry, is what it's called. There's a registry at IANA, which lists the location of the RDAP server for registrars and for all of the TLDs. What you will need to be able to do, as a client, is to stay up to date with that file. It is actually just a file on ICANN website. It's not likely to change very much, quite honestly. I would expect not even a change once a week, probably—probably even less frequently than that.

But if you have a client, you're going to have to have your client, in some way, maintain that list internally. It's going to have to know that list, and go grab it once in a while, and stay up to date. It's an important consideration for you, as you develop a client, to think about

maintaining that list. And then, with that list, when somebody wants to look up a domain name, you now have to know where to go.

And then, there's one other detail to follow from there. That tells you where to find … You'll want to start at the registry, probably, and see what data they have. But just as they were talking about the consent issue, the question that comes up is, it's entirely possible a registrar will display more information than the registry might about a name, for any number of different reasons. As a client, in an automated way, you will have the ability, on behalf of your user, to follow those links, and figure all of that out, and display everything all at once.

So, the client can actually be built in such a way as to ask the registry about the domain name. You'll get back a registrar ID as part of all of that, and using that information, you can follow through to find the RDAP URL for that particular registrar, and you can follow that through, and make that query, and get that data, and then display all of that to the user. You can just do all of that on behalf of the user.

There's an automation here now that was not really available in the case of WHOIS, so you can start to follow those links and think about those kinds of things as a client server. That's a new kind of feature that enhances things in general.

RICK WILHELM: Great summary, Jim. While Jim was talking, I put the link to the JSON file into the chat. Because I don't want everybody to leave at the same time, we will not put the JSON up on the screen. If you look at that link,

don't be off-put by it if you're not a programmer. If you are a programmer, it looks beautiful. If you're not a programmer, it may look horrendous, but if you show it to your programmers, they will say, "Wow, that looks beautiful," because it is deliciously structured and easily parsable by modern programming tools.

Therefore, as Jim mentioned, it makes it very easy for a reasonably-programmed client, constructed by either a reasonable or unreasonable programmer, because there are both varieties, to be put together, that is able to start at the top and hit all of the TLDs easily, and access, by virtue of knowing this one URL of the Bootstrap file, which is a well-known, stable URL that isn't going to change, because it's memorialized in an RFC.

This is something that represents a really—an almost unheralded … It needs to get popularized a little bit more, I think. Maybe we need to make t-shirts that say, "All hail the Bootstrap file," or, "One Boostrap to rule them all," or something like that. Maybe we'll make some movies, Quoc.

JIM GALVIN: Will there be leather involved?

RICK WILHELM: Whatever it takes. Really, because the Bootstrap file really is that central point of access that allows a client to go chase all these things. The ICANN client—lookup.icann.org—uses this Bootstrap file, which is why you can type in any gTLD domain name, and it will go hit that no

matter which registry it's used. If that gTLD domain name TLD's RDAP server performs correctly and spits back the registrar URL, as Jim said, it will also go and chase that data down out of the registrar server.

So, if you or any of your programmers had been doing cross-TLD WHOIS output parsing, which is the kind of things that takes years off one's life, RDAP will make you age less quickly, I think, is the way I put it colloquially. Jim?

JIM GALVIN: I want to add one more feature that client servers can be thinking about, that is interesting. One of the things that I really like about RDAP is the fact that it makes this option available. Right now, the way that WHOIS is done is as Contracted Parties in the gTLD side, there is an obligation to present the output in exactly this way, with these US ASCII labels, with exactly these spaces and this colon, and the data over here.

What's interesting is with RDAP, what you're going to get back in a response is a structured dataset, and structured in a way that the client can now manipulate that data and do interesting things to it on behalf of the user.

Some very straightforward, obvious things they could do for the user the label which you put in front of the value. So, for somebody's full name, you could say "full name," if it was English. If you were in a different language, you could put the label in that language and display it that way on behalf of your client. So, you have context in which your

particular user is working, and you can take advantage of that context and do things with the label.

You can also imagine there might be opportunities to do various kinds of transliteration and translation of the data that's actually there. That might be an option that you can consider and pull together on behalf of your user as a client, because you now have context in which to do that.

That was never available in WHOIS because it's not structured data. It's not a structured metadata system based on the web. RDAP is basically a web-based protocol, so you get all of the features that you have in the web when you're dealing with queries and responses. It's important to keep that in mind.

So, you have a lot of options—a lot of features that you can now bring to pair on the output that you're presenting to your user, and do things on behalf of them. Internationalization is a big one. It's one of the real features that RDAP brings to the table. Thanks.

QUOC PHAM: Since we're on a roll, and the crowd is clearly clamoring for more—wanting more things to think about—I'll add to what Jim added—is with the advanced features comes some complication in development. The size of the response is … Even the standard RDAP response is about 10 times bigger than a WHOIS response. Instead of getting a one-kilobyte response, you'll get 200 kilobytes maybe, so you have to think about that.

Also, another thing is with, when we do get around to figuring what all individuals do with searches in that particular feature, is response time. RDAP itself is built on a much more complicated tech stack. You add authentication to it as well. It adds more complexity. So, there's more time spent in the backend doing things. So, off the start, it does appear a little bit slower than WHOIS, but it's a new protocol. It's using much more complicated technology, so it's not a simple tool—not a simple API, I should say.

Not technical, but ccTLDs are not obliged to have RDAP, so while you're implementing, there may be some ccTLDs that offer it, so that's great. First of all, they're not obliged. And another one is they're not obliged to follow any profile. Should they follow the RFC standards? Yes. Should they update based on ICANN's latest profile, or the subsequent ones that will come? Sure. But they're not obliged to. So, that's something to always remember, that consistency in responses from ccTLDs versus gTLDs will also be exactly what WHOIS is right now.

One last one is the Bootstrap file is great. Jim Galvin is correct. It's going to be rarely changed, but it does change. The public aren't privy to migration of TLDs, nor are they privy to acquisitions of registrars with each other and things like that. So, yes, it rarely changes, but these public data points are there for you to refer to. So. I would say refer to them, not constantly—that's wrong—but regularly—once a week, once a month. Something like that would be useful. Thanks.

RICK WILHELM: Thanks, Quoc. Great comments. One gentle tweak on the ccTLD. They may not be required. You're probably right, as far as them being required to do RDAP. They may not be required. It's really depending, up to their particular contract in their agreement. I'm just tuning the words a little bit, because there may be.

I don't have encyclopedic knowledge of ccTLDs and their contractual provisions, but I'm generally I in agreement with what you were saying, about highlighting the difference between the gTLDs, which do have a requirement, and the ccTLDs, which do not have the ICANN requirement, which I think is an important point to highlight.

On the tech stack, you're right. That's a very different tech stack than the WHOIS tech stack that we've been working with. Let me go to Jody a little bit. You want to talk a little bit about the RDAP tech stack? Is that an easy enough softball for you? He doesn't know. We'll find out. It's like we're working without a net, so we'll see what happens.

JODY KOLKER: The tech stack for the current WHOIS is basically over port 43. It is basically just TCP, if anybody's curious. All it is, is text. Basically, if you're looking up godaddy.com, you find out where their server is, the IP address, and send in godaddy.com with a slash r slash n on the back, and it will return automatically with a complete dump of whatever GoDaddy has for godaddy.com. That goes for every WHOIS server currently.

RDAP actually is run over HTTPS, so it can basically be run from any browser. You can type in … I believe GoDaddy's web address is something like rdap.godaddy.com/v1/domain, and the godaddy.com, and you can do what from any browser. So, there's nothing a user needs to do in order to get … A client is not needed, basically. What has happened is websites have come up—all kinds of websites—for WHOIS lookups, that are not registrars or registries, that actually go out and scrape that data and bring it down to you.

What can happen now, is by knowing where the RDAP URL is for any registry or registrar, you can simply type in their URL address into your website, with the domain that you want to look up, along with … You can also do name server lookups and contact lookups, as long as you know the ROIDs, which is completely different. But you are able to do that for RDAP.

It's basically run over HTTPS. Anyone can do any lookups from any browser, as long as you know where the RDAP URL is. It's a lot different. It's more secure. And as Jim was saying, based on credentials, it will depend on whether users will be able to get a complete dump of the WHOIS information or not.

RICK WILHELM: Great points. From a client side, you don't need a specialized WHOIS client. You don't need to know how to use Telnet or something like that. Everybody has a browser. Pretty much everybody has a browser that they're using.

On the server side—and this is getting to Quoc's point—it has a much heavier-weight implementation on the server side, because you're running a full web server with HTTPS, SSL-secured, so connection setup and teardown is more expensive, and it sits with a heavier footprint on the server. That's something else to consider, if you're a server-side implementer and thinking about sizing, and capacity planning and stuff. I think that's some of what you were pointing at. The good news is, though, that your developers will probably like it a lot more, if you're on the server side and also on the client side. Developers will be much happier in this world also.

Again, if you've got questions, the mic line has been… Sue's been doing a great job controlling the mic line. There are many reasons why we love Sue in the RDAP Working Group. That is just one of them, is her ability to manage the mic line. Also, if you're on the chat and you want to, as Sue had mentioned at the beginning, just type in a question in the chat, we can take that. I'm getting to the end of the topics that I had prepared, as far as questions. Oh, look. It's Rich Merdinger. Question from the audience.

RICH MERDINGER: Rich Merdinger, GoDaddy. I was told there'd be snacks.

RICK WILHELM: Yes, we do have snacks. Sue's here, yeah.

RICH MERDINGER: Thank you very much for clarifying. We appreciate that, for the record.

RICK WILHELM: We're here for you, Rich. We got your back. Sue's taking care of you. Like I said, there are many reasons we love Sue.

UNIDENTIFIED FEMALE: There's always snacks at the RDAP meeting.

RICK WILHELM: Exactly. Always snacks at the RDAP meeting. I'm going to cook up some questions. It is kind of getting late in the day. I'm going to go and go with one last set of comments from each of my panelists, and see if they have anything else that they want to offer. And then, we'll probably wrap it up, unless someone has some questions between now and then.

But hopefully this is helpful for everybody. We want to give a chance to give some comments and capabilities in a slightly different form, with a words-to-PowerPoint ratio that was more in line with what I think it should be. So, I'm going to not go out of previous sequence, because I don't want to shock Sarah by making her go first. Oh! Sarah's volunteering to go first. She's fearless. Go, Sarah.

SARAH WYLD: You can't stop me. I think it's just really great that we have this new technology that has the ability to differentiate the response based on who's looking it up. I think we can't say enough about how important

that is, especially in terms of protecting the privacy rights of data subjects, which is a topic near and dear to my heart. So, I'm very glad that we do have some attention to this, and I hope that if you do have any questions, please feel free to come and talk to us individually, if you come up with them after the panel. Thank you.

JODY KOLKER: I think one of things that we didn't mention yet for RDAP is that the old WHOIS over port 43 only supported ASCII characters. One of the great things of RDAP is that registrants, or customers, will be able to type in their name, no matter what script they are using, and that will be able to be returned in RDAP. I think that that's a great function to have, and I'm really looking forward to that. Thanks.

JIM GALVIN: I'm going to take the fear side—I guess a closing comment. It really has been just an excellent experience. I've been very supportive of RDAP, way back from the days when we were first doing the RDAP protocol. I think I'll take approach of saying what is the thing that … If I were to think about RDAP today, what's the thing that keeps me up at night?

What I would encourage folks in the audience to do is to start using the RDAP. Start looking at it and see how it works. You're going to want to see it from a user perspective, and think about it. If you're not going to be a developer on behalf of a client or a server, and whether that's a registry or a registrar server, get used to the idea that it's a replacement for WHOIS. Right now, you can use it. It'll give you the same information

that WHOIS does. But actually, take the trouble to look around and see what it does.

On the Contracted Parties side of the house, for gTLDs at least, we've now opened the process where we're thinking about what are going to be the requirements going forward on RDAP. Of course, the RDAP … The obligations on behalf of servers, as far as that's concerned. The RDAP Working Group is focused on the way in which it wants RDAP to behave in a technical context, and in response to policies that are coming out.

So, with respect to the RDAP working group, there's a little bit of a widow here for making suggestions, and highlighting issues, and questions and comments. We could use that information. There's just not a lot of user experience with RDAP. Now is the time to go check that out. One of the reasons why I think that's especially important is not just because of the response, but to build on the suggestion that there's new and interesting responses with what the data's going to look like.

Credentials is something that we have not addressed yet at all, and credentials is something we essentially have no experience with in this kind of system—in the RDDS system. WHOIS didn't have any kind of credential layer on it. So, with respect to the future, obviously a big part of the EPDP, in a very 50,000-foot level, is what does it mean to have authenticated access to data? There's a public version of data. One of the reasons why that group exists, in the large, in a very gross-level sense, is how do you distinguish between who's asking, and what they're asking for, and then whether or not you're going to give it to them.

Although in the Internet in general, we have a fair amount of experience with credential systems—there are a lot of choices, and a lot of technologies there—we don't really know what that needs to look like, and what it should be on behalf of RDAP.

So, now's the time to understand how RDAP works, and as the EPDP comes to an end, we're going to be talking about credentials, and what those credentials should look like. It would be good to have some base of experience as we enter the conversation about credentials and where that goes. Those are my two things, and future-looking, and that kind of thing. Thanks.

QUOC PHAM: Being at the bottom of the line, I benefit from getting all the ideas, and then coming up with some gold. Get ready, everybody. I'll start with fear—with what Jim Galvin started off with. Now that everyone's converted and understands what RDAP is, the next part is to go basically … How shall I put it? I won't put it in any way. I'll just say what I want to say.

RDAP is not WHOIS. RDAP is a replacement of WHOIS as a protocol. RDAP is not replacement of WHOIS in terms of function. What I mean by that is things like a web version of RDAP. Things like that don't exist. RDAP is an API. It's meant for machines to talk to other machines, and that's its sole existence. Will there be webpages that serve domain registration information? Yes, there will be. Will they use RDAP underneath, as a way of communication? Sure. It depends on how you develop it.

Lookup. Icann.org uses RDAP to talk. If we decide to build up a website to show registration information … When I say "we," it is as registry or as a registrar. We're not using RDAP. We're using whatever technology we want to use. I think that there is a very important distinction. It has to be very clear so that end users know what they're talking about, or understand what they're getting themselves into, but also for developers, and also for us, when we're dealing with these complications.

I think that has been a big challenge in the adoption of RDAP, is that fact that someone comes along and goes, "Oh, cool. You've got an RDAP service," clicks on the browser, and gets jumbled data. And then, the Rick Wilhelm decision making process of, "If I'm a developer, it looks beautiful. If I'm not a developer, it looks horrendous," kicks in.

Now I'll move over the happy place, which is this has been quite a bit of fun for us. We've explored credentials, and we've developed our own model. If you do have legitimate requests, or legitimate requirements, to come and gather unredacted data from us—from any of the TLDs that are on our system—then there's a way to do it. It's covered by our Policy Team, so nothing untoward is there, so that's checked. But it's something that we've come up with.

At the beginning, I made a statement about it will change because of what happens with the EPDP, what happens with SSAC, with the Unified Access Model, then blah, blah, blah, blah, blah. That will change. Yes, I acknowledge that, but we have something that works now. In the spirit of gathering feedback from the community, and making things better

overall, I, like Jim, invite everyone to use RDAP on any one of our servers, and give us the feedback that we need to make it better. Thanks.

RICK WILHELM: Thanks, Quoc. Great comments there. Just a couple of thoughts here. I was listening to our panelist. WHOIS has been around for a long time. As a protocol and as an application, it shows its age, as you can tell. A lot of people don't realize this. I know that Jim does. It's got a three-digit RFC, which to those of you that hang around the IETF … As you can tell, it makes them chuckle. The rest of you are like, "Yeah. So what?" It's got a three-digit RFC. The RFC that Jody was speaking about earlier is in the 8,000 range, so it's that old.

JIM GALVIN: Did you just date me?

RICK WILHELM: No, I just said you have an appreciation of history. How about that? Was that pretty slick or what? Okay. It's got some issues. It's got inconsistent output, as we've mentioned here. As Sarah got mentioning towards, it does not have an integrated authentication model. You open up a socket, and you let it rip, and you really don't know who's on the other end of that socket.

And it's completely decentralized. You have to either know where the WHOIS service is or find a search engine. If you're an application

developer trying to build an integrated client, good luck. It's a good way to, like I said, take years off your life.

RDAP fixes a lot of these issues. Just in the running down the line, Jody brought up ASCII versus IDNs. We didn't even dig into the IDN thing, but IDNs is great thing that is fully supported within RDAP, and doesn't even get any attention at all, and no love, as it's said, within the land of WHOIS. We could have probably spoken for a while around that. So, I would definitely encourage those of you that are on the client side and using RDAP to be digging into this. If you're on the server side, and you want to talk about it, certainly feel free to reach out.

We'll look around the room for questions. I'd like to thank the panelists for their time, and attention, and preparation, and also for their ongoing contributions over the past, goodness, way more than a year. This group meets every week, and we spend time. "It's only an hour a week," as the saying goes, whenever you're getting roped into any sort of a volunteer job. It's certainly a lot more than that, so certainly appreciate their contributions. Thanks, everybody, for coming today. Thank you for your attention. We certainly appreciate your attendance. Sue, I think we'll wrap it up.

[END OF TRANSCRIPTION]