

SAC120: SSAC Input to GNSO IDN EPDP on Internationalized Domain Name Variants

A Report from the Security and Stability Advisory Committee

28 April 2022

Preface

In this document the Security and Stability Advisory Committee (SSAC) provides written input to the Generic Name Supporting Organization Expedited PDP on Internationalized Domain Names (GNSO IDN EPDP) on matters pertaining to IDN variants.

The SSAC focuses on matters relating to the security and integrity of the Internet's naming and address allocation systems. This includes operational matters (e.g., pertaining to the correct and reliable operation of the root zone publication system), technical administration matters (e.g., pertaining to address allocation and Internet number assignment), and registration matters (e.g., pertaining to registry and registrar services). SSAC engages in ongoing threat assessment and risk analysis of the Internet naming and address allocation services to assess where the principal threats to stability and security lie, and advises the ICANN community accordingly. The SSAC has no authority to regulate, enforce, or adjudicate. Those functions belong to other parties, and the advice offered here should be evaluated on its merits. SSAC members participate as individuals, not as representatives of their employers or other organizations. SSAC consensus on a document occurs when the listed authors agree on the content and recommendations with no final objections from the remainder of the SSAC, with the exception of any dissenting opinions or alternative views that are included at the end of the document.

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Executive Summary

In this report, the ICANN Security and Stability Advisory Committee (SSAC) provides advice to the ICANN Generic Name Supporting Organization (GNSO) Expedited Policy Development Process (EPDP) on Internationalized Domain Names (IDNs). The advice concerns the management of internationalized domain name variants.

From the SSAC's perspective, a variant management mechanism serves two purposes: to enhance security and stability of IDNs that have variants, and to promote an acceptable experience that meets the user expectations for those IDNs.

To ensure security and stability of IDNs with variants, an IDN and its variants must be treated as *a single package* from a domain provisioning and life cycle management perspective. Otherwise, users of IDNs that have variants would be susceptible to phishing and other impersonation attacks.

To promote an acceptable experience that meets the user expectations for those IDNs that have variants, variants of an IDN that are in *actual* use can be delegated. However in defining rules for such delegations, policy makers need to be aware of two *very* important limitations.

- The first limitation is that there is no protocol solution in DNS to enforce equivalence of variant domains throughout the DNS hierarchy. In addition, there are no protocol solutions for applications such as HTTP, SMTP, or TLS to ensure equivalence of variant domains in their operations.
- The second limitation is that management of variants can introduce a combinatorial explosion at registries, registrars, and registrants. If not handled well, such variants would create operational problems for these entities.

These limitations call for a conservative approach in the delegation and management of variant domain names. One should start with the question: is one label sufficient? If one label is not sufficient are 2 labels necessary? Then apply the technically-driven conditions defined in this document to arrive at an acceptable answer. An alternative approach would be to only delegate the variants that are uniquely differentiated from the primary IDN label and that are widely recognized in the community of use. Regardless of method, we advise a stringent approach in the beginning to ensure conservatism, and which may be relaxed over time, as the community gains experience with IDN variant TLD delegation and associated usability and manageability challenges.

Finally, the DNS root zone is a special zone that is shared by everyone on the Internet, and needs a set of label generation rules (LGRs) that ensure minimal conflict, minimal risk to all users, and minimal potential for incompatible change over time. Thus, the Root Zone LGR (RZ-LGR)¹ should be used by ICANN to determine variants for all *current* and *future* TLD labels.

¹ See Root Zone Label Generation Rules, <https://www.icann.org/resources/pages/root-zone-lgr-2015-06-21-en>

1 Introduction

On 17 January 2022, members of the ICANN Security and Stability Advisory Committee (SSAC) and members of the ICANN Generic Name Supporting Organization (GNSO) Expedited Policy Development Process (EPDP) on Internationalized Domain Names (IDNs) held a joint meeting to discuss matters pertaining to variants of IDNs.

The two groups discussed SSAC2021-09: SSAC Response to IDN EPDP – Request for Early Input.² As a result of the discussion, several important points about IDN variants were articulated. For the benefit of the IDN EPDP Working Group as well as the broader ICANN community, the SSAC captures the key points from the discussion and publishes the following report as formal advice to the IDN EPDP.

This report includes an excerpt of relevant IDNs EPDP charter questions,³ questions asked by the EPDP team, and the SSAC’s response.

1.1 Terminology

This report uses the following conventions from the ICANN IDN Variant Integrated Issues Report,⁴ and the proposed procedure to develop and maintain the label generation rules for the DNS root zone.

IDN Variant - An IDN variant is an alternate code point (or sequence of code points) that could be substituted for a code point (or sequence of code points) in a candidate label to create a variant label that is considered the “same” in some measure by a given community of Internet users.⁵ There is no general agreement of what that sameness requires. Section 3 of ICANN’s Variant Integrated issues report provides a fuller categorization of variants. It should be noted that ICANN makes a distinction between code point variants, where a single character is in some way closely related to – or likely to be confused with – an alternative, and whole-string variants, where the token at issue is longer than a character, and may be a morpheme, a full word, or a phrase, or some meaningful element in a language that uses the script. The current versions of the root LGR procedure and user experience documents focus on the code point variants, not the whole-string variants.

When the term “variant” is used in this report it includes, if not explicitly stated otherwise, all kinds of variants, including those that are allocatable, blocked and transitive.

² See SSAC2021-09: SSAC Response to IDN EPDP – Request for Early Input, <https://www.icann.org/en/system/files/files/ssac2021-09-17nov21-en.pdf>

³ For the complete text of the questions, see Section II: Mission, Purpose, and Deliverables, Expedited Policy Development Process on Internationalized Domain Names Charter, <https://gnso.icann.org/sites/default/files/file/field-file-attach/idns-epdp-charter-10may21-en.pdf>

⁴ See The IDN Variant Issues Project: A Study of Issues Related to the Management of IDN Variant TLDs (Integrated Issues Report), <https://www.icann.org/en/system/files/files/idn-vip-integrated-issues-final-clean-20feb12-en.pdf>

⁵ See section 1.2 of the Integrated Issues Report.

2 SSAC's Overall Input on IDN Variants

Regarding the definition of variants:

- The SSAC believes language and script communities with proper expertise should determine what is a variant for a given Unicode codepoint. Label generation rules can then be constructed to determine what would be variants for a given DNS label. From a stability and security perspective, it is critical to have a set of consistent label generation rules for a given DNS zone. It is also desirable, but not mandatory, to have consistent label generation rules across zones.
- The root zone is a special zone that is shared by everyone on the Internet, and needs a set of label generation rules (LGRs) that ensure minimal conflict, minimal risk to all users, and minimal potential for incompatible change over time. Thus, the Root Zone LGR (RZ-LGR)⁶ should be used by ICANN to determine variants for all *current* and *future* TLD labels.
- There is a difference between what code points are allowed in a TLD name and what code points are allowed in the immediate child labels of a TLD (i.e. code points in the 2nd level domains). The root zone is special, and that is specifically an ICANN responsibility.
- From a technical perspective, two strings that are delegated in the DNS are two different delegations just like any two other domain names. Variants are no exception.

Regarding the purpose of variant management mechanisms:

- A variant management mechanism serves two purposes: to enhance security and stability of IDNs that have variants, and to promote an acceptable experience that meets the user expectations for those IDNs. From the SSAC's perspective, the first goal is the most important one.
- To ensure security and stability of IDNs with variant labels, an IDN and its variants must be treated as *a single package* from a domain provisioning and life cycle management perspective. All domain names in this package must have the same registration and expiry dates, same registrant, admin, billing and technical contacts, same domain status. They should also have the same applicable grace periods for add, renew, auto-renew, transfer and redemption.⁷ Management actions to *any* domain name in a variant package must apply to *all* the domain names in this package. These include takedowns, transfers, etc. Without such rules, users of IDNs that have variants would be susceptible to phishing and other impersonation attacks.

⁶ See Root Zone Label Generation Rules, <https://www.icann.org/resources/pages/root-zone-lgr-2015-06-21-en>

⁷ See RFC 3915: Domain Registry Grace Period Mapping for the Extensible Provisioning Protocol (EPP). Available at: <https://datatracker.ietf.org/doc/html/rfc3915>

- To promote an acceptable experience that meets user expectations for those IDNs that have variants, variants of an IDN that are in *actual* use can be delegated. This will broaden the use of IDNs to the entire script community or communities who were previously not able to access an IDN due to input method limitations, but would otherwise recognize the domain names. However in defining rules for such delegations, policy makers need to be aware of several important limitations.
 - a. There is no protocol solution in DNS to enforce resolution equivalence for variant domains throughout the DNS hierarchy. At the top-level, ICANN policy may require the variant TLDs point to the same nameserver. At the second level, registries may develop solutions to provision the variant names under management to resolve to the same nameserver. However, beneath the second-level, there are no cost-effective technical solutions or enforcement mechanisms to ensure or enforce resolution equivalence. Furthermore, although desirable, it is unclear whether users of variant names have expectations that variants of a domain name must have the same name server as the original domain name.
 - b. In addition to the DNS, domain names are used in many other applications. There are no protocol solutions for applications like HTTP, SMTP, or TLS to ensure two variant domains are handled the same way.
 - c. Furthermore, the management of variants can introduce a combinatorial explosion at registries, registrars, and registrants. If not handled well, it would create operational problems for these entities.
- These limitations and incompatibilities described above mean that the user experience for variant domains will be poor. Policy makers need to recognize this limitation and ensure they do not try to enforce equivalence by technical means.
- These limitations and incompatibilities would also call for a conservative approach in the delegation and management of variant domain names.
 - a. One should start with the question: is one label sufficient? If one label is not sufficient are 2 labels necessary? Then apply the technically-driven conditions defined in section 3.4 of this document to arrive at an acceptable answer.
 - b. An alternative approach would be to only delegate the variant labels that are uniquely differentiated from the primary label that are widely recognized in the community of use. For example, the Chinese community allows for three variant labels, one which has been applied-for, one which is the Simplified Chinese version, and one which is the Traditional Chinese version.
 - c. Regardless of methods, we advise a stringent approach in the beginning to ensure conservatism, and which may be relaxed over time, as the community gains experience with IDN variant TLD delegation and associated usability and manageability challenges.

3 SSAC's Specific Input to the IDN EPDP

This section contains the SSAC's response to specific questions from the IDN EPDP.

3.1 Input to Charter Questions A1 & A4

IDN EPDP Charter Questions A1 & A4 state:

A1: For existing delegated gTLD labels, does the WG recommend using the RZ-LGR as the sole source to calculate the variant labels and disposition values?

A4: Should the SubPro recommendation 32.1⁸ be extended to existing TLDs that apply for a variant TLD label whose script is not yet supported by the applicable version of the RZ-LGR? If not, what should be the process for an existing TLD registry who wishes to apply for a variant TLD label whose script is not yet supported by the applicable version of the RZ-LGR?

Based on the charter question, and reviewing SSAC2021-09, the IDN EPDP Working Group asked:

- The Root Zone LGR procedure defines a Maximal Starting Repertoire—a subset of IDNA protocol valid code points— of which any given script LGR repertoire selects the allowable code points. The final product is merged into the Root Zone LGR, the code point repertoire of which could be smaller or identical to the Maximal Starting Repertoire, but never larger.
- Can SSAC elaborate on their comments to questions A1 and A4? On one hand (A1) SSAC recommends "the root zone must use one and only one set of rules for the Root LGR procedure". On the other hand (A4) SSAC is of the opinion that "there is no reason to prohibit" an application so long as it is allowed by IDNA, albeit variant labels will remain disallowed. Is SSAC of the opinion that this should apply to any IDN application in the future — an IDN label should not be prohibited so long as its code points are IDNA valid?

The SSAC's Responses are:

- The SSAC sees a difference between a number of different questions:

⁸ For future gTLD applications, the SubPro PDP Recommendation 25.2 proposes Implementation Guidance 25.3 that "if a script is not yet integrated into the RZ-LGR, applicants should be able to apply for a string in that script, and it should be processed up to but not including contracting. Applicants under such circumstances should be warned of the possibility that the applied-for string may never be delegated and they will be responsible for any additional evaluation costs." The burden in this case is on the applicant, who may have to wait for an indeterminate amount of time but is not aware of any other serious concerns. See Final Report on the new gTLD Subsequent Procedures Policy Development Process, <https://gnso.icann.org/sites/default/files/file/field-file-attach/final-report-newgtld-subsequent-procedures-pdp-02feb21-en.pdf#page=115>.

- What code points are allowed in a TLD label?
- What code points are allowed in the immediate child labels of a TLD (i.e. code points in the 2nd-level domains)?

The SSAC advises that one must separate the discussions of what code points can be allowed in the root zone and what code points can be allowed in the child labels of a specific TLD. The root zone is special, and that is specifically an ICANN responsibility.

- As stated in SAC060, the root zone is necessarily shared by everyone on the Internet, and needs a set of label generation rules (LGR) that ensure minimal conflict, minimal risk to all users (independent of the language or script they are using and independent of gTLD or ccTLD), and minimal potential for incompatible change over time. The SSAC stands by its prior recommendation in SAC060 and advises the IDN EPDP that the Root Zone LGRs be used for all current and future TLDs to determine variant labels.
- The SSAC further advises that should an existing TLD apply for a variant TLD label whose script is not yet supported by the applicable version of the RZ-LGR, the rational approach is to put the application on hold, gather the script community to develop the LGR for that script, and integrate it into the root zone LGR. After that, ICANN can use the updated root zone LGR to generate variants.

3.2 Input to Charter Question A2

IDN EPDP charter question A2 states:

A2: If some self-identified “variant” TLD labels by the former gTLD applicants are not found to be consistent with the calculation of the RZ-LGR, but have been used to a certain extent (e.g., used to determine string contention sets), how should such labels be addressed in order to conform to the LGR Procedure and RZ-LGR calculations?

Based on the charter question, and SSAC’s early input , the IDN EPDP Working Group asked:

- It may be helpful to clarify the following SSAC early input: “An analysis of the delegated variant labels in ccTLDs against the most current version of LGR would answer whether this is a hypothetical question or not.”
- Since the charter question is asking in the context of gTLDs, regarding the reference of “delegated variant labels in the ccTLDs”, does the SSAC actually mean “synchronized TLDs”, or perhaps “self-identified variant gTLD labels identified by the gTLD applicants from the 2012 round”?

The SSAC’s Responses are:

- If a self-identified “variant” TLD label by a former gTLD applicant is found to be inconsistent with the calculation of the RZ-LGR, but has already been used to a certain extent (e.g., used to determine string contention sets), the SSAC advises that the proper process is for the evidence to be presented to the RZ-LGR generation or integration panel, and a review of the script LGR be requested. Upon the review, if the use is found acceptable by the LGR generation or integration panel, an updated RZ-LGR should be created following the proper process. It is important not to make exceptions just because a variant TLD that was not calculated using the RZ-LGR has already been used to a certain extent. Such ad-hoc exceptions, whether via policy or through executive decisions, will make the RZ-LGR less stable.
- In offering this input above, the SSAC would like to point out that in general LGRs exist not only to set a boundary on the strings an applicant may apply for, but also to create a predictive environment for designers of services, applications, user interfaces, for their users, who all depend on domain names. Therefore, the process for creating and updating an LGR must be very stable.

3.3 Input to Charter Questions A5 & C2

IDN EPDP charter questions A5 & C2 state:

A5: Should there be a ceiling value or other mechanism to ensure that the number of delegated top-level variant labels remains small, understanding that variant labels in the second level may compound the situation? Should additional security and stability guidelines be developed to make variant domains manageable at the registry, registrar, and registrant levels?

C2: How does the “same entity” requirement impact the current rules for Registry Operators for activating IDN variant labels?

Based on the charter question, and SSAC’s early input , the IDN EPDP Working Group asked:

Question #1:

SAC060 Recommendation 14 says, “ICANN should ensure that the number of strings that are activated is conservative”; and goes on to rationalize that:

“Variants introduce a permutation issue both at top level as well as with combinations of the top level and second level”, giving the following example:

- A TLD string with 4 characters with 3 variants each, produces a variant set of 81 different strings ($3^4 = 81$)

- An SLD (under such above TLD) with 4 characters with 3 variants each, produces a variant set of 72,171 different strings ($3^4 \times 3^4 = 72,171$)

and that "[s]uch a large number of variant strings present challenges for management of variant domains at the registry, the registrar and registrant levels."

Could the authors please elaborate, by using a theoretical example, on the nature of the challenges in managing variant domains at registry, the registrar and registrant levels?

Question #2:

In agreeing with the user experience report recommendation that ICANN must implement a conservative variant TLD allocation process, SSAC suggests:

- In SAC060, that "A variant TLD application must be accepted only if the TLD applicant clearly demonstrates the necessity for activating the string. Variants that are not necessary, but are desired, must not be allocated and activated" and
- In SSAC2021-09, that "[...] there should be a mechanism to ensure that the number of delegated top-level variant labels remains small. Unless there is demonstrated widespread usage of the variant label, the variant label should not be activated."
- The basic idea in both SAC060 and SSAC2021-09 is "allocate/activate only the labels you really need - don't just figure out the complete set of possible variants from the LGR and allocate/activate all of them." The reason is simple: the larger the set of labels that must be managed as a variant bundle by the registry, registrars, applications, and users, the harder it will be to maintain the "works the same way" experience that variants are expected to support.

Could the authors please suggest criteria for or provide examples of what constitutes a demonstration of "the necessity for activating the string" or "widespread usage of the variant label"?

The SSAC's responses to Question #1 are:

- *Illustration of the combinatorial effect:* consider the following *hypothetical* Chinese script TLD 台湾大学 (taiwan university). According to the RZ-LGR version 4, the variants for each character are: 臺 - {臺, 台, 檯, 簃, 颱} (variant set 457),⁹ 灣 - {灣, 湾} (variant set 1502),¹⁰ 大 - {大}, 學 - {學, 学, 孝} (variant set 751).¹¹ So for TLD 台湾大

⁹ See Root Zone LGR for script: Han (Hani), Variant Set 457 — 5 Members, https://www.icann.org/sites/default/files/lgr/lgr-4-chinese-script-05nov20-en.html#varset_457

¹⁰ See Root Zone LGR for script: Han (Hani), Variant Set 1502 — 2 Members, https://www.icann.org/sites/default/files/lgr/lgr-4-chinese-script-05nov20-en.html#varset_1502

¹¹ See Root Zone LGR for script: Han (Hani), Variant Set 751 — 3 Members, https://www.icann.org/sites/default/files/lgr/lgr-4-chinese-script-05nov20-en.html#varset_751

学, the number of variant set generated by the RZ-LGR are $(5 \times 2 \times 1 \times 3 = 30)$.¹² We note that variants generated from the RZ-LGR may be large, however, in actual usage, they are more limited. For example, in the case of Chinese script, users rarely mix simplified and traditional script.

- *Impact to registrars:* Not all variant labels can be activated. The majority of them would be blocked or allocated to the same applicant. Nevertheless a registrar's system may need to be able to generate the variants based on user input, validate variants based on LGR, dispose of variants with assigned statuses, and/or store variants in its databases. In addition, the registrar needs to implement the variant management policy set by ICANN and the registry operator. Finally, a registrar would need to support customer service calls for variant related questions and disputes.
- *Impact to registries:* Registries may need to validate variants submitted by registrars against LGR. Registries would also need to develop or enable support for variants via EPP. Given that no DNS protocol solution exists for automatic variant management, registries need to implement provisioning tools for equivalence or implement variant management policies. Finally, registries need to consider WHOIS/RDAP querying of variants.
- *IDN variant label management is a complex undertaking.* The SSAC believes that combinatorial explosion at registries, registrars, and registrants creates an operational problem for the DNS.
 - Given the combinations possible, an algorithm created by a registrant, registrar, or registry could choose for registration the maximum variant set that can reasonably be handled - there are economic benefits for registries and registrars, and perhaps for registrants. However, the management of potentially hundreds of variants associated with a given primary label poses significant technical and management challenges for the parties involved.
 - Examples of challenges include compliance actions on individual variants while still maintaining primary labels. These include takedowns, transfers, law-enforcement tracking, etc. These are not edge cases.
 - This combinatorial explosion creates a stability issue at both registrars and registries, and will likely complicate account management and user experience for registrants.
- Once variant forms of a domain name are set up, by whatever means, applications such as web and mail servers need to be configured to treat them appropriately. In our limited experience, they are not. Although this problem has been known in the community for

¹² See Appendix C.1 of Report on Chinese Variants in Internationalized Top-Level Domains, <https://archive.icann.org/en/topics/new-gtlds/chinese-vip-issues-report-03oct11-en.pdf>

over a decade, we are unaware of any tooling to provision variant DNS names in applications automatically.

- From the SSAC's perspective, a variant management mechanism serves two purposes: to enhance security and stability of IDNs that have variants, and to promote an acceptable experience that meets the user expectations for those IDNs. From the SSAC's perspective, the first purpose is the primary one.

The SSAC's responses to Question #2 are:

- The SSAC supports the following criteria to determine which variants should be activated, as articulated by ICANN in the IDN Variant TLD Implementation Appendices:¹³
 - a. The IDN variant TLD label must be specified for a specific language community, which should have been supported by the relevant script Generation Panel in their proposal.
 - b. The IDN variant TLD for the target language should be a valid label using that language based Reference Second Level LGR released by ICANN, if available. In case the reference LGR is not available or the applicant requires additional characters to support the language, the IDN variant TLD label should be valid using the relevant language based second-level IDN table proposed for it.
 - c. The variant label must be usable. People of the target community should be able to compose the variant TLD using generally available input method editors (IME).
 - d. The variant label should follow the orthographic conventions of the script and the relevant language community.
 - e. The variant label must demonstrate association or meaningfulness in relevant cases (country or geographic names, brands, trademarks, etc.)

3.4 Input to Charter Question A5

IDN EPDP charter question A5 states:

A5: Should there be a ceiling value or other mechanism to ensure that the number of delegated top-level variant labels remains small, understanding that variant labels in the second level may compound the situation? Should additional security and stability guidelines be developed to make variant domains manageable at the registry, registrar, and registrant levels?

Based on the charter question, and SSAC's early input , the IDN EPDP Working Group asked:

¹³ See IDN Variant TLD Implementation: Appendices, <https://www.icann.org/en/system/files/files/idn-variant-tld-appendices-25jan19-en.pdf>

SAC060 notes that variant code points in LGR may introduce a “permutation issue”, possibly creating a large number of variant domain names, which “presents challenges for the management of variant domains at the registry, the registrar and registrant levels.”

SAC060 advises that “ICANN should ensure that the number of strings that are activated is as small as possible.

1. Although this advice sounds like it is sensible:
 - a. How can this practically be implemented?
 - b. What does “As small as possible” really mean?
 - c. Who determines what is “as small as possible” means?
 - d. What is a number that would be anything other than arbitrary?
2. According to the Rationale, it appears that the SSAC is presenting this advice to protect registries, registrars and registrants from themselves. In other words, the advice assumes that registries, registrars and registrants will want to activate more strings than they would be able to handle.
 - a. Normally all policy starts from the basic presumption that each of the actors involved will act in a rational manner and in their own best interests. This is the basis of all business and economic theory. But this policy recommendation takes the opposite view and starts from the premise that registries, registrars and registrants will essentially try to activate more than they can handle and thus we need to protect them from themselves. Is there any evidence upon which that assumption is based?
 - b. Given no proof that registries will intentionally activate more strings than they can handle, should we really be placing any artificial limits?
 - c. Assuming we either have or do not have a limit, how do we determine when a registry, registrar or registrant has more challenges than they can handle? What do we do? Is this really an ICANN problem?
 - d. Finally, given all of the above, shouldn't we allow registries, registrars, and registrants to figure out what it is that they can handle as opposed to placing an arbitrary limit?

The SSAC's Responses are:

- The practical implementation is to initially allow the minimum number that is absolutely required.
 - In the minimal case it is identified that a variant to a primary label is treated as a blocked variant in a bundle, so only one of the strings (the primary label) is delegated.
 - This at least prohibits other applicants to register the variant, and that way create an ability for phishing and confusion for the end user.

- “As small as possible” is reasonably easy to assess - you start with the question - is one label necessary & sufficient? If not, are 2 labels necessary - and apply the conditions defined earlier in Section 3.4 answers to Q2. This is not arbitrary, it’s technically driven.
- An alternative approach would be to only delegate the label and the variant labels that are uniquely differentiated from the primary label and widely recognized in the community of use. For example, the Chinese community allows for three variant labels, one which has been applied for, a second which is the Simplified Chinese version and a third which is the Traditional Chinese version. A similar limit may be imposed in the beginning to ensure conservatism, and then relaxed over time as the community gains experience with IDN variant TLD delegation and its associated usability and manageability challenges.

3.5 Input to Charter Questions B3 and C4A

IDN EPDP charter question B3 and C4A states:

B3: Beyond having the same Registry Operator and same back-end registry service provider, as referenced in b1) and b2), is there a need for additional constraints for the same entity requirement for the top-level? If so, the rationale must be clearly stated.

C4a: May the set of allocatable or activated second-level variant labels not behave identically under an individual TLD, which does not have any variant TLD label?

Based on the charter question, and SSAC’s early input , the IDN EPDP Working Group asked:

SSAC members are welcome to further elaborate on the following early input: “The SSAC wishes to emphasize that currently there is no DNS protocol solution that enforces equivalence (or the same behavior) of variants in the DNS. Policy makers need to recognize this limitation and ensure they do not try to enforce equivalence by technical means. So in essence, although administratively these domains are considered a package, technically speaking, they are different domain names.

The SSAC’s Responses are:

- There is no protocol solution, neither in DNS nor in other protocols like HTTP, SMTP, TLS and such. Some efforts in the IETF related to potentially creating relationships between different domain names in the DNS (BNAME, DNAME) have not gained traction in the technical community, but they would still not solve issues in, for example, X.509 certificates used in TLS and elsewhere.
- Once variant forms of a domain name are set up by some means, applications such as web and mail servers have to be configured to treat them appropriately as equivalent domain names. In our limited experience, they are not. Although this problem has been

known in the community for over a decade, we are unaware of any tooling to provision variant DNS names in applications.

- There is no universal understanding of what “identically” means in this context. For example, if a website has both simplified and traditional Chinese DNS names, does the site display the same content for both names, or does the site display different content for each name?
- These are issues that have no uniform technical solutions. It might one day be possible to find technical solutions, but work has not started in the IETF regarding changes to the protocols involved, primarily because (as noted above) there’s no shared understanding as to what “identical” means or how to agree on a satisfactory way to represent it in the the DNS. If such agreement can be reached we can see development of interoperable solutions, but support for IDN variants is not currently a work item for any IETF Working Group. Because technical solutions are missing, and everyone involved has to find workarounds to these issues, the more variants a registry activates, the more challenging it becomes for management.
- Thus, the SSAC advises that variants be limited to a business point of view that describes a situation where the same applicant can get more than one domain name allocated. From that point in time, the set of domain names can be registered as a bundle, but always used as individual domain names.

4 Acknowledgments, Statements of Interest, and Dissents, Alternative Views and Withdrawals

In the interest of transparency, these sections provide the reader with information about four aspects of the SSAC process. The Acknowledgments section lists the SSAC members and outside experts who contributed directly to this particular document, as well as ICANN org staff who facilitated the work. The Statements of Interest section points to the biographies of all SSAC members and invited guests, which disclose any interests that might represent a conflict—real, apparent, or potential—with a member’s or invited guest’s participation in the preparation of this Report. SSAC members participate as individuals, not as representatives of their employers or other organizations. SSAC consensus on a document occurs when the listed authors agree on the content and recommendations with no final objections from the remainder of the SSAC, with the exception of any dissenting opinions or alternative views.¹⁴

The Dissents and Alternative Views section provides a place for those individual members to describe any disagreement that they may have with the content of this document or the process for preparing it. The Withdrawals section identifies individual members who have withdrawn and recused themselves from discussion at any stage during the development of this report. Except for members listed in the Dissents and Alternative Views and the Withdrawals sections, this document has the consensus approval of all of the members of SSAC.

¹⁴ See SSAC Operational Procedures v9.0, Section 1.1, <https://www.icann.org/en/system/files/files/ssac-operational-procedures-v9.0-05jan20-en.pdf>

4.1 Acknowledgments

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4.2 Statements of Interest

SSAC member biographical information and Statements of Interest are available at:
<https://www.icann.org/resources/pages/ssac-biographies-2021-12-21-en>

4.3 Dissents and Alternative Views

There were no dissents or alternative views.