Private Space Names

Roy Arends, DNSOP, IETF106

draft-arends-private-use-tld

Problem Statement

- There are no private names in the DNS.

  - Such as "X-headers" MIME types (RFC2045)
  - Such as Address Allocation for Private Internets (RFC1918)
  - Such as "x-" subtag in private use language tags (RFC5646)
  - Such as private use ASNs (RFC6996)
  - Such as private use DNS RRTypes and DNS RCODES (RFC6895)

Observed Solution Space

- "Register your own name" (not really private)
- "Don't do it" (often heard, doesn't work)
- "pick something easy to remember, not used elsewhere"
- .INTERNAL (draft-wkumari-dnsop-internal)
- .LOCAL (Microsoft Technet Article) RFC6762

  [...] it is strongly recommended that you use the .local label for the extension. [...]

- .ALT (draft-ietf-dnsop-alt-tld)
- HOME.ARPA

Frequently used string	As of Nov 2019	Past 3 months
HOME	2.784%	2.579%
LAN	1.194%	0.985%
DHCP	0.761%	0.674%
INTERNAL	0.652%	0.664%
LOCALDOMAIN	0.359%	0.415%
IP	0.314%	0.404%
CORP	0.235%	0.242%
DLINK	0.187%	0.159%
WLAN_AP	0.171%	0.097%
OPENSTACKLOCAL	0.146%	0.000%
DLINKROUTER	0.138%	0.155%
LAN1	0.121%	0.116%
GATEWAY	0.112%	0.083%

ITHI data

Proposed Solution Space Constraints

- Simple and concise BCP

- Choose a label WITHOUT a semantic meaning
    Preferably short
    internal ≠ private ≠ alt ≠ local ≠ home.arpa
    Too Anglophonic

- Choose a label that is defined as never to collide
    Prevent collision with anything expected in the future

- Maybe a two-character ASCII domain

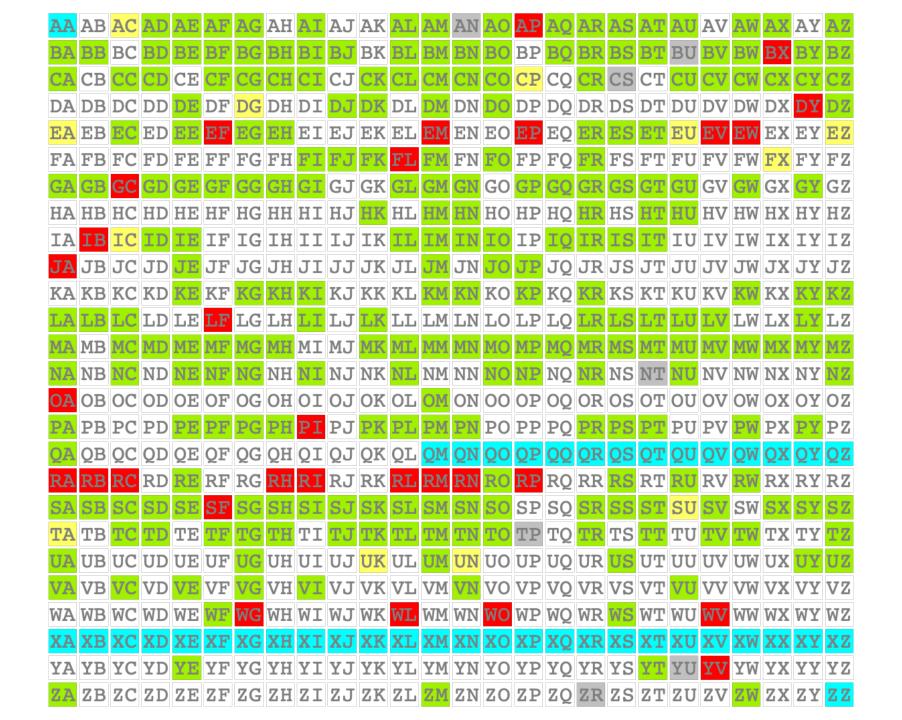# RFC1591 Domain Name System Structure and Delegation

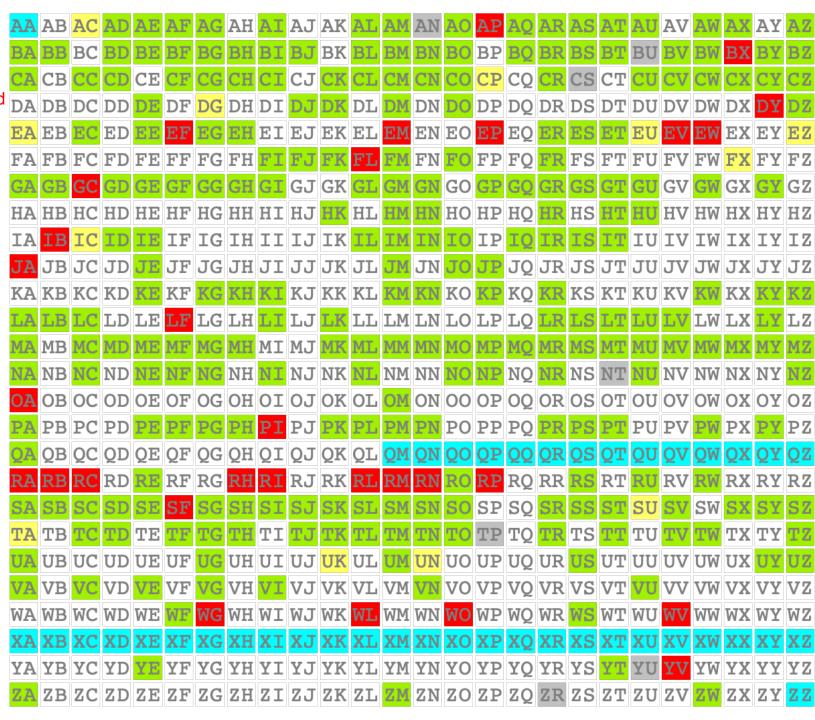4. Rights to Names

   2) Country Codes

     The IANA is not in the business of deciding what is and what is not a country.

     The selection of the ISO 3166 list as a basis for country code top-level domain names was made with the knowledge that ISO has a procedure for determining which entities should be and should not be on that list.

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ
CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ
DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ
EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ
FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ
GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ
HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ
IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ
JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ
KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ
LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ
MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ
NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ
OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ
PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ
QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ
RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ
SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ
UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ
VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ
WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ
XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ
YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ
ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ
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JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ
KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ
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RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ
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VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ
WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ
XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ
YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ
ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ

AB Un-assigned
AD Assigned
UK Exceptionally reserved
AN Transitionally reserved
EW Indeterminately reserved
ZZ User Assigned

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
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CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ
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LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ
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RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ
SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ
UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ
VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ
WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ
XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ
YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ
ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ

User Assigned
AA
QM .. QZ
XA .. XZ
ZZ

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ
CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ
DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ
EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ
FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ
GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ
HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ
IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ
JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ
KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ
LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ
MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ
NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ
OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ
PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ
QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ
RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ
SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ
UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ
VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ
WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ
XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ
YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ
ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ

What does ISO3166 say about this range?

5.2   Construction of the alpha-2 code

The ISO 3166 standard uses combinations in the range AB to QL, RA to WZ, and YA to ZY.

In addition exactly 42 alpha-2 code elements are not used in the ISO 3166, AA, QM to QZ, XA to XZ, ZZ.

8.1   Special Provisions

Users sometimes need to extend or alter the use of country code elements for special purposes. The following provisions give guidance for meeting such needs within the framework of this part of ISO 3166.

8.1.3   User assigned code element

If users need code elements to represent country names not included in this part of ISO 3166, the series of letters AA, QM to QZ, XA to XZ, and ZZ are available.

How are User Assigned Codes used elsewhere?

ISO 3901 International Standard Recording Code

> Reserves "ZZ" for direct registrants independent of any country.

ISO 4217 Codes for the representation of currencies

> Reserves the "XA" .. "XZ" range for transactions and precious metals, as they are country independent.

ISO 6166 International securities identification numbering system

> Reserves "XS" for securities cleared through Euroclear/Clearstream.

How are User Assigned Codes used elsewhere?

ICAO International Civil Aviation Organization
        Reserves "ZZ" for UN travel documents.

IATA International Air Transport Association
        Reserves "XK" for Kosovo and "XU" for Russia TC3

WIPO World Intellectual Property Organization
        Reserves 5 User Assigned code elements to identify
        regional agencies and patent offices, and allocated "XX"
        for "Unknown states, other entities or organizations".

How are User Assigned Codes used elsewhere?

UN/LOCODE United Nations Code for Trade and Transport Locations
Reserves "XZ" for international waters

WORLDBANK

Reserves "XC" for the Euro Area. "XU" for "North America" area, and many other X* codes are used.

INTERPOL   Destination Agency Identifier (DAI)
Reserves "ZZ/ALL" for transactions distributed by interpol.

CABforum Certificate Authority and Browser Forum
Reserves "XX" to signify a location not covered by ISO3166-1.

How are User Assigned Codes used elsewhere?

UNICODE Common Locale Data Repository (CLDR) version 36 (latest)

QO countries in Oceania that do not have a subcontinent.

QU deprecated: the canonicalized form is EU

XA special code indicating derived testing locale with English + added accents and lengthened

XB special code indicating derived testing locale with forced RTL English

XK industry practice

ZZ used in APIs or as replacement for invalid code

How are User Assigned Codes used elsewhere?

RFC5646 BCP47: Tags for Identifying Languages

contains a section and examples dedicated to Private Use Sub-tags.

"For example, the region subtags 'AA', 'ZZ', and those in the ranges 'QM'-'QZ' and 'XA'-'XZ' (derived from the ISO 3166-1 private use codes) can be used to form a language tag. A tag such as "zh-Hans-XQ" conveys a great deal of public, interchangeable information about the language material"

sq-XK	Albanian (Kosovo))	shqip (Kosovë)
sr-Cyrl-XK	Serbian (Cyrillic, Kosovo)	српски (ћирилица, Косово)
sr-Latn-XK	Serbian (Latin, Kosovo)	srpski (latinica, Kosovo)

How are User Assigned Codes used elsewhere?

RFC5890: Internationalized Domain Names for Applications

How was "XN—" chosen? [*]

Protocol:

The following steps will be used to select the two-character code:

The code will be selected from among a subset of the entries on the ISO 3166-1, clause 8.1.3 User-assigned alpha-2 code elements: AA, QM to QZ, XA to XZ, and ZZ. The selection is limited to these codes because of the following:

The use of ISO 3166-1 user-assigned elements removes the possibility that the code will duplicate a present or future ccTLD code.

[*] `https://psg.com/~randy/lists/iesg/2003/msg01081.html`

In Conclusion

ISO3166-1 Alpha 2 UA codes are used as intended in various standards

     implies

ISO3166-1 Alpha 2 UA codes will never be ISO assigned or reserved

     implies

ISO3166-1 Alpha 2 UA codes may never be delegated as country codes

     implies

ISO3166-1 Alpha 2 UA codes are collision free

     and

ISO3166-1 Alpha 2 UA codes have no semantic meaning

Different codes, different uses

- There are 42 codes in the ISO-3166-1 Alpha 2 User-Assigned range
- Codes can be assigned for specific uses
- An IANA protocol registry can be created for specific uses.
  - With "Standards Action" or "IESG Approval" requirements (RFC5226)
- If this was done 10 years ago, we may have
  - … .ZZ for private use names
  - … .XH for homenet names
  - … .XM for mDNS names
  - … .XO for onion names
  - … .XL for local names

Do these need an (unsigned) delegation in the root?

- Not delegated:
  - A validator will validate that these TLDs do not exist.
  - This will negate any inserted private name space data.
  - A validating (stub) resolver needs a negative trust anchor for these TLDs.

- Delegated:
  - avoids configuring each individual stub validator with a negative trust anchor.
  - Allows any inserted private name space data.
  - A validating (stub) resolver needs a trust anchor for a signed private space TLD.
    - Allows it to only trust your own signed private name space.

Painting the bike shed*, I suggest

.zz

For private use names

*Parkinson's law of triviality

Next steps

- Move the discussion to the DNSOP WG mailing list
  - Continue to work on draft-arends-private-use-tld
- IFF there is sufficient WG interest, by IETF107 (Vancouver, Mar'20):
  - Ask the WG chairs to adopt the draft as a WG item
- IFF the WG adopts the internet draft
  - Engage early with IESG, IAB, IANA and ICANN communities to develop a path of least surprise

Thank you