

DNS/DNSSEC Workshop

In conjunction with LKNOG8

13-16 August 2024



Introductions – Trainers

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Internationalized Domain Names (IDNs)

Top-level Domain Name Mnemonics in ASCII

Using Letters only

- Letters [a-z]
- ~~Digits [0-9]~~
- ~~Hyphen (-)~~

1

	0	1	2	3	4	5	6	7
0	NUL	DLE	space	0	@	P	`	p
1	SOH	DC1 XON	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3 XOFF	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	del

Domain Name Mnemonics in ASCII

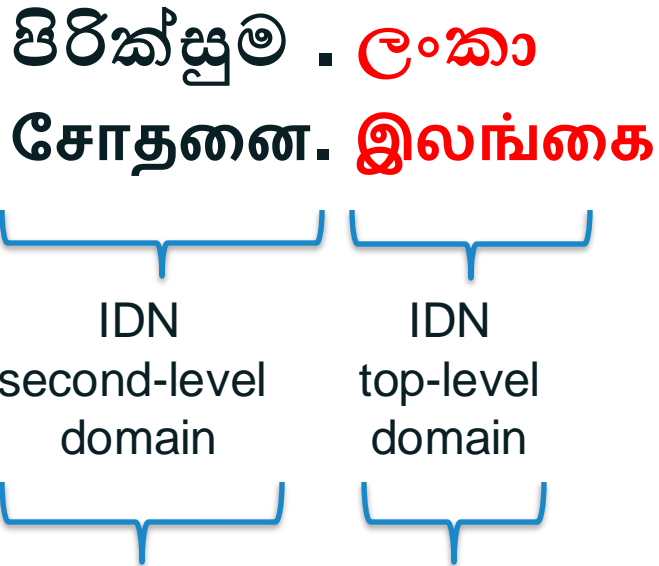
Using LDH

- Letters [a-z]
- Digits [0-9]
- Hyphen (H)

2

	0	1	2	3	4	5	6	7
0	NUL	DLE	space	0	@	P	`	p
1	SOH	DC1 XON	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3 XOFF	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	del

Internationalized Domain Name (IDN) Labels



Syntax of IDN Labels

Valid U-Label: Unicode code points as constrained by **the “LDH” scheme** within IDNA 2008

②

Syntax of IDN Labels

Valid U-label, further constrained by **the “letter” principle** for TLDs

①

IDN Mnemonics

0D80

Sinhala

0DFF

0B80

Tamil

0BFF

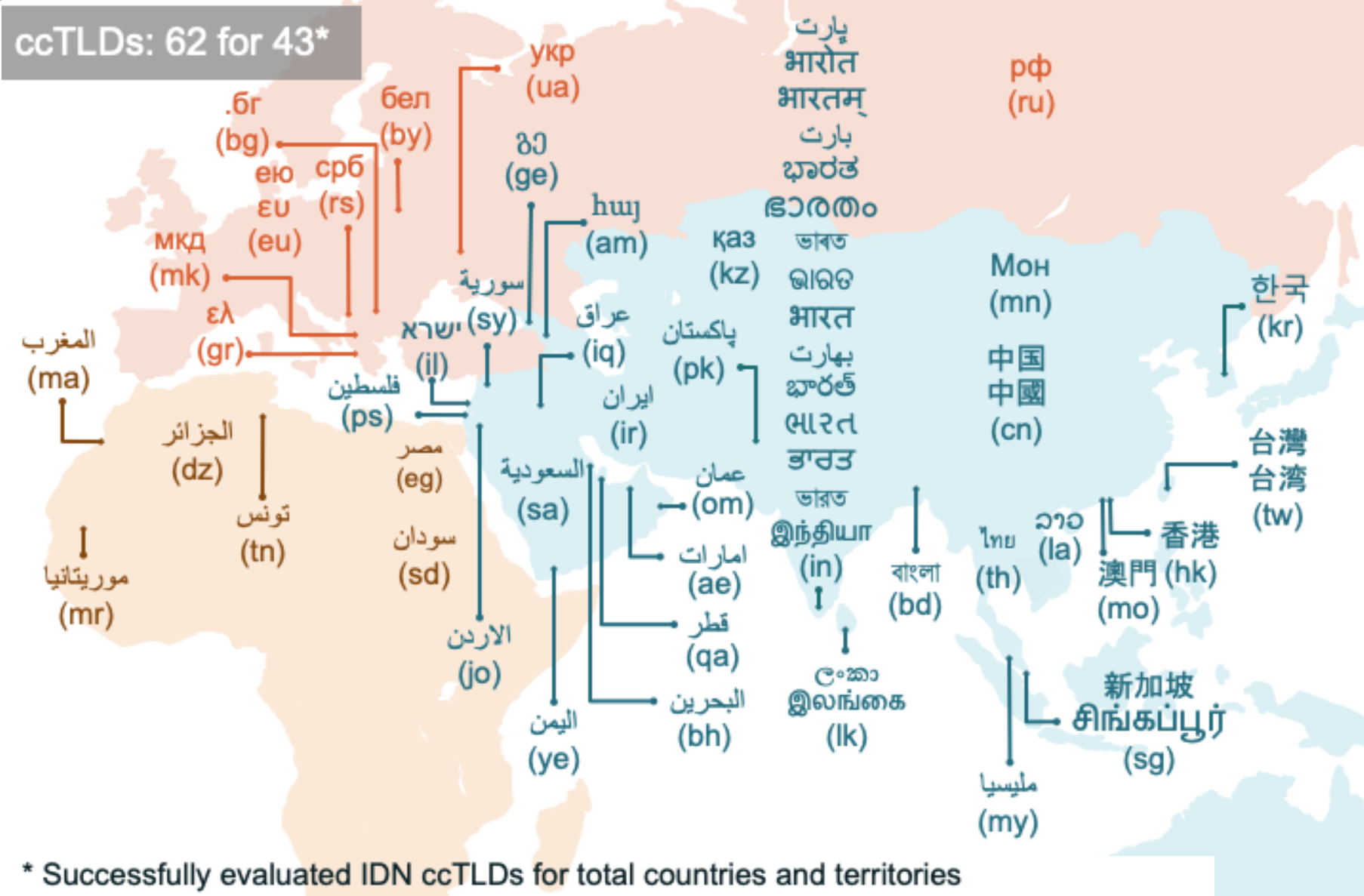
	0D8	0D9	0DA	0DB	0DC	0DD	0DE	0DF
0	ෆ	ආ	ච	ඳ	ච	ෆ		
1	ෆ	ආ	භ	න	ශ	ෆ		
2	ෆ	ආ	භ		භ	ෆ	ෆ	ෆ
3	ෆ	ආ	ක	ඳ	ස	ෆ		ෆ
4	ෆ	ආ	ක	භ	භ	ෆ		ෆ
5	ආ	ආ	ආ	ආ	ආ			
6	ආ	ආ	ආ	ආ	ආ	ෆ	ෆ	
7	ආ		ආ	ආ		ෆ		
8	ආ		ආ	ආ	ෆ	ෆ		
9	ආ		ආ	ආ	ෆ	ෆ		
A	ආ	ආ	ආ	ආ	ෆ	ෆ	ෆ	
B	ආ	ආ	ආ	ආ	ෆ	ෆ		
C	ආ	ආ	ආ		ෆ	ෆ		
D	ආ	ආ	ආ	ආ	ෆ	ෆ		
E	ආ	ආ	ආ		ෆ	ෆ		
F	ආ	ආ	ආ		ෆ	ෆ	ෆ	

	0B8	0B9	0BA	0BB	0BC	0BD	0BE	0BF
0	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
1	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
2	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
3	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
4	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
5	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
6	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
7	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
8	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
9	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
A	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
B	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
C	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
D	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
E	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ
F	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ	ෆ

Unicode

- Encoding glyphs into codepoints
- In specifications, codepoints are shown in hex using the U+XXXX notation
 - E.g. code point for **ə** is **U+0DA0**, code point for **ƒ** is **U+0B9A**
- Codepoints are typically carried using the UTF-8 (Unicode Transformation Format, 8 bit) format
 - Variable number of bytes for a single codepoint
 - ASCII is used as is.
 - Gold standard for carrying Unicode codepoints, in web, protocols, etc...

IDN Country Code Top-Level Domains (ccTLDs)



* Successfully evaluated IDN ccTLDs for total countries and territories

What Is Universal Acceptance?

**All domain names and email addresses work
in all software applications.**



пример.рф

Internationalized
Domain Names



site.example

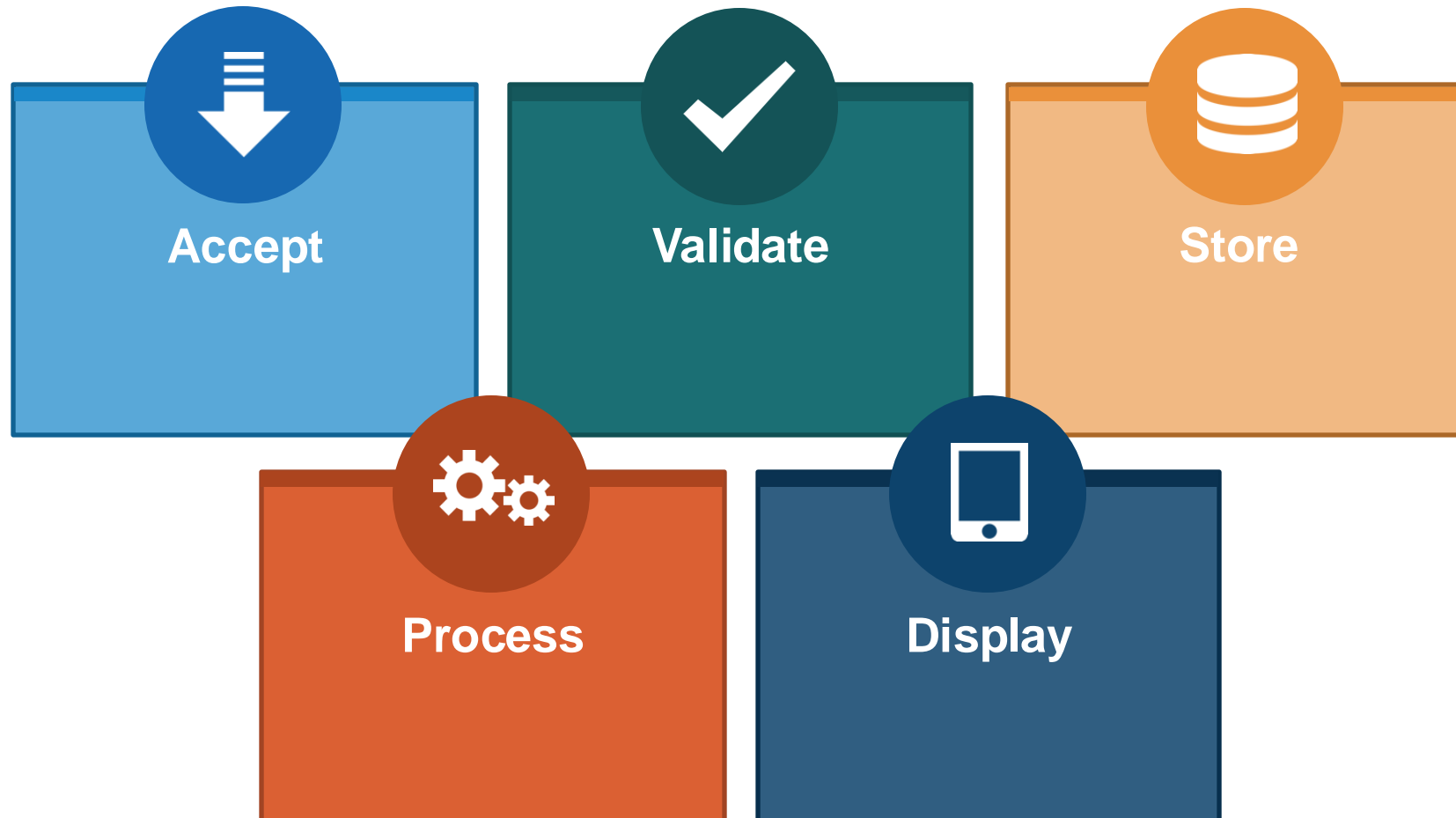
New gTLDs



名称@网站.域名

Internationalized
Email Addresses

Key Principles of UA Readiness



The Role of Universal Acceptance

UA-ready

http://soap.organic

Welcome to organic

SOAP

We make the best soap in the world. It's 100% organic.

http://tokyo.ストア

TOKYO

当社の製品を購入します


  

http://bank.com


Bank

Email


 Email validated.
Account created.

Not ready

http://soap.organic




http://tokyo.ストア



http://bank.com

Bank

Email

 Not a valid email address.

Categories to Support for UA Readiness



○ Domain Names

- **Newer** top-level domain names: example.**sky**
- **Longer** top-level domain names: example.**melbourne**
- **Internationalized** domain names **சீரீக்ஐஐஐ.ஓஓஓ சோதனை.இலங்கை**

○ Internationalized email addresses (EAI):

- **ASCII@IDN** champika@சீரீக்ஐஐஐ.org
- **Unicode@ASCII** உஓஓஓ@example.com
- **Unicode@IDN** சஓஓஓஓஓ@சீரீக்ஐஐஐ.ஓஓஓ
- **Unicode@IDN**; right to left scripts **ای-میل@مثال.موقع**



Accept



Validate



Process



Store



Display

Process of using IDNs

- User enters in a browser: `https://` `பெரீக்ஐஐம.ல஑கா` Or `ச஑ாதன.இலஙகை`
- Browser does normalization on the user entry.
- Browser converts `பெரீக்ஐஐம.ல஑கா` in an ASCII compatible representation called Punycode [RFC3492], and adds 'xn--' in front of it.
 - `பெரீக்ஐஐம.ல஑கா` becomes: `xn--3zc5cnk5b2b1cbv.xn--fzc2c9e2c`
- Browser calls the DNS to get the IP address of `xn--3zc5cnk5b2b1cbv.xn--fzc2c9e2c`
- Browser connects to the HTTP server at the received IP address.

Engage with ICANN – Thank You and Questions



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