

# LTSI workshop at Embedded Linux Conference IPv6 Evaluation Report of 3.10-LTSI

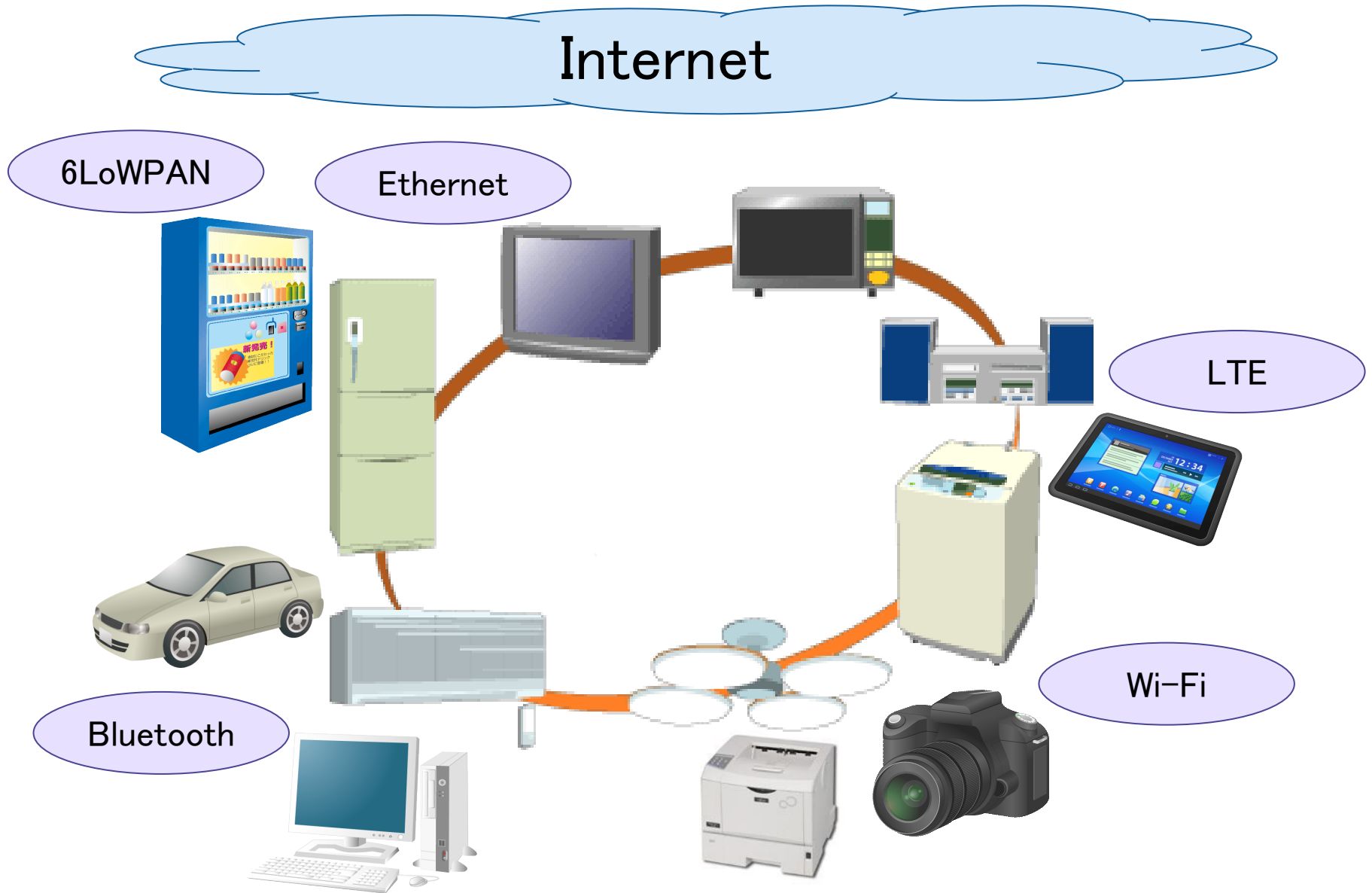
Apr 30th, 2014

Teppei ASABA, Fujitsu Computer Technologies

- In-House Embedded Linux Distributor of Fujitsu
- Our Distribution includes LTSI Kernel and is built with Yocto Project
- Our Distribution is used for
  - Server System Controller
  - Storage System
  - Network Equipment
  - Printer
  - IVI
  - etc.



# IoT devices need IPv6



# IPv6 Ready Logo Approved



IPv6 Ready Logo Program Approved List - Mozilla Firefox

Program App... +

www.ipv6ready.org/db/index.php/public/search/?vn=fujitsu&do=1&lim=25

Approved Site	Application Phase	Test Category	Vendor Name	Region/Country Name	Product Name	Product Version	Product Classification	Compliance Test	
<a href="#">02-CS-001003</a>	2014/04/02	Phase-2	IPsec	FUJITSU COMPUTER TECHNOLOGIES LIMITED	JP	ubinux	v12.1	End-Node	1.11
<a href="#">02-C-001143</a>	2014/02/13	Phase-2	Core Protocols	Fujitsu	JP	AROMA-Plus	eth1	Host	4.0.6
<a href="#">02-C-001142</a>	2014/02/13	Phase-2	Core Protocols	Fujitsu	JP	AROMA-Plus	eth2	Host	4.0.6
<a href="#">02-C-001115</a>	2013/12/17	Phase-2	Core Protocols	Fujitsu	JP	LT270S2	V10L20 or later	Host	4.0.6
<a href="#">02-C-001112</a>	2013/12/12	Phase-2	Core Protocols	FUJITSU LIMITED	JP	FUJITSU Network MobiSart	V01	Router	4.0.6
<a href="#">02-C-001003</a>	2013/06/23	Phase-2	Core Protocols	FUJITSU COMPUTER TECHNOLOGIES LIMITED	JP	ubinux	v12	Host	4.0.6
<a href="#">02-C-000711</a>	2012/06/11	Phase-2	Core Protocols	Fujitsu Technology Solutions	DE	openNet Server (BS2000/OSD)	3.5 A	Host	4.0.6
<a href="#">02-C-000583</a>	2011/11/16	Phase-2	Core Protocols	FUJITSU LIMITED	JP	Si-R G series	V2	Router	4.0.6



<https://www.ipv6ready.org>

Our Distribution was approved with Kernel v2.6.29, v2.6.31, v2.6.36, v3.0 and v3.4(\*)

(\*) Under Application

# IPv6 Evaluation Report of 3.10-LTSI

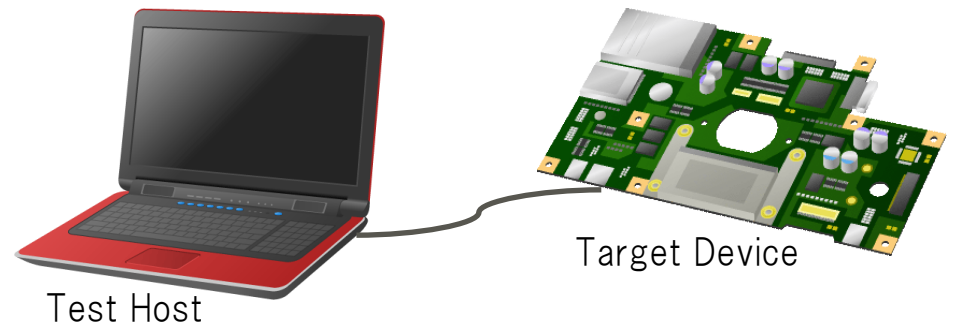
- IPv6 Ready Logo Conformance Test
- IPv6 Security Test

- What's IPv6 Ready Logo  
<https://www.ipv6ready.org>
- IPv6 Ready Logo test suite  
<http://www.tahi.org>
- Conformance test suite of IPv6 specification
- Test for IPv6 protocol stack (only Kernel)

# Results of IPv6 Ready Logo Conformance Test

Kernel Version : 3.10-LTSI  
Tool Version : REL\_3\_3\_2  
Test Program Version : V6LC\_5\_0\_0  
Target Device : Minnow Board

Section	RFC	Summary	Total	Pass	Fail	N/A
Section 1	RFC 2460	IPv6 Specification	54	53	0	1
Section 2	RFC 4861	Neighbor Discovery for IPv6	236	214	15	7
Section 3	RFC 4862	IPv6 Stateless Address Autoconfiguration	45	45	0	0
Section 4	RFC 1981	Path MTU Discovery for IPv6	16	15	0	1
Section 5	RFC 4443	ICMPv6	25	24	0	1



# Fails of IPv6 Ready Logo Conformance Test



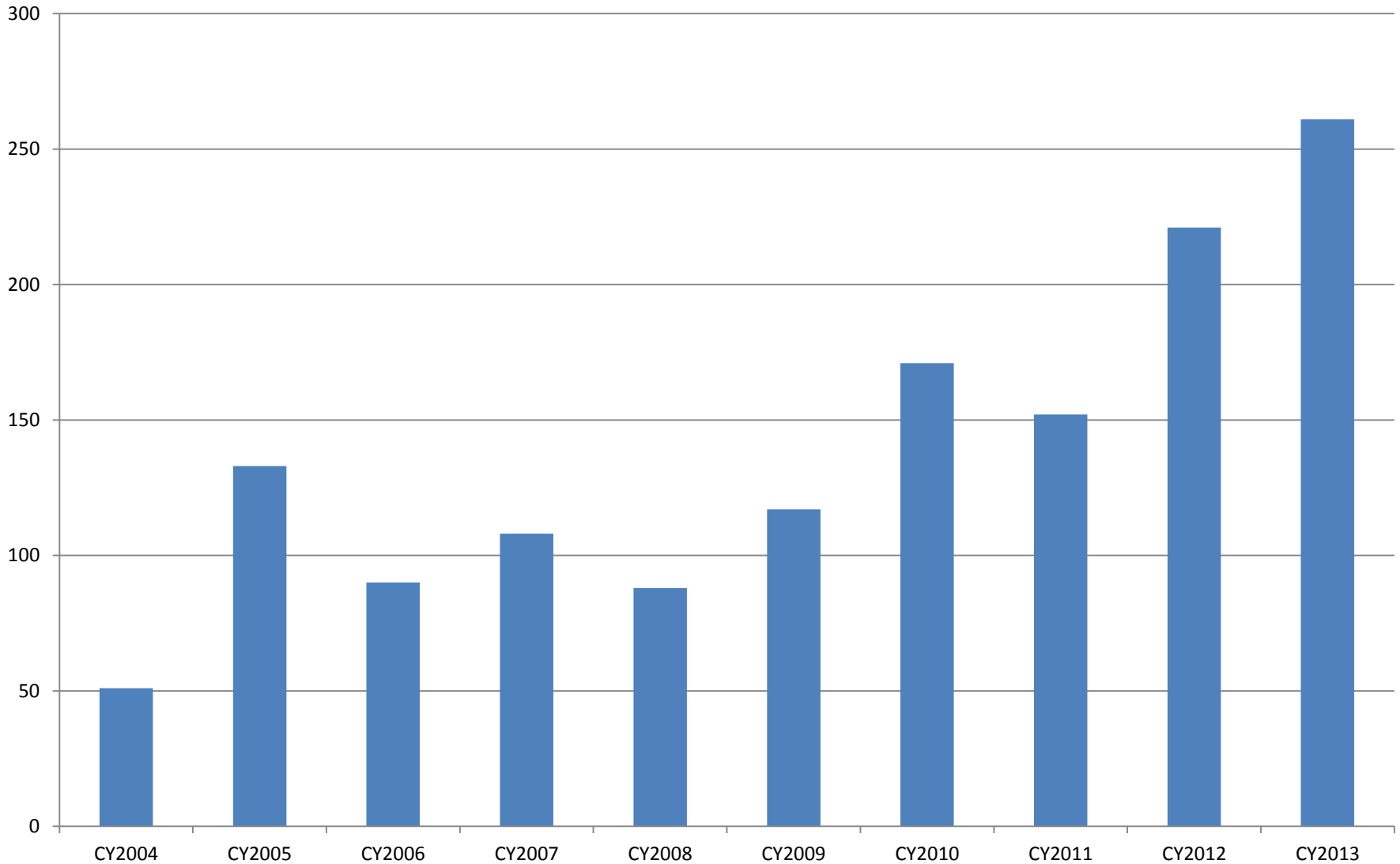
No.	Name	Title
138	Test v6LC.2.2.11: Default Router Switch (Hosts Only)	Default Router Switch
185	Test v6LC.2.3.4: Redirected to Alternate Router: Valid (Hosts Only)	Default Router Switch
187	Test v6LC.2.3.4: Redirected to Alternate Router: Valid (Hosts Only)	Part A: dst=global, w/o TLL, w/o Redirected Header
189	Test v6LC.2.3.5: Redirected to Alternate Router: Suspicious (Hosts only)	Part C: dst=global, w/ TLL, w/o Redirected Header
190	Test v6LC.2.3.5: Redirected to Alternate Router: Suspicious (Hosts only)	Part A: Option Unrecognized
200	Test v6LC.2.3.7: Redirected Twice (Hosts Only)	Redirected Twice
201	Test v6LC.2.3.8: Invalid Option (Hosts Only)	Part A: Path MTU Option
202	Test v6LC.2.3.8: Invalid Option (Hosts Only)	Part B: Prefix Information Option
203	Test v6LC.2.3.8: Invalid Option (Hosts Only)	Part C: Source Link-layer Address Option
204	Test v6LC.2.3.9: No Destination Cache Entry (Hosts Only)	No Destination Cache Entry
206	Test v6LC.2.3.10: Neighbor Cache Updated, No Neighbor Cache Entry (Hosts Only)	Part B: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
210	Test v6LC.2.3.11: Neighbor Cache Updated from State INCOMPLETE (Hosts Only)	Part B: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
215	Test v6LC.2.3.12: Neighbor Cache Updated from State REACHABLE (Hosts Only)	Part C: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
220	Test v6LC.2.3.13: Neighbor Cache Updated from State STALE (Hosts Only)	Part C: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
225	Test v6LC.2.3.14: Neighbor Cache Updated from State PROBE (Hosts Only)	Part C: TLLA Option, No Redirected Packet Option, Link-layer Address Updated



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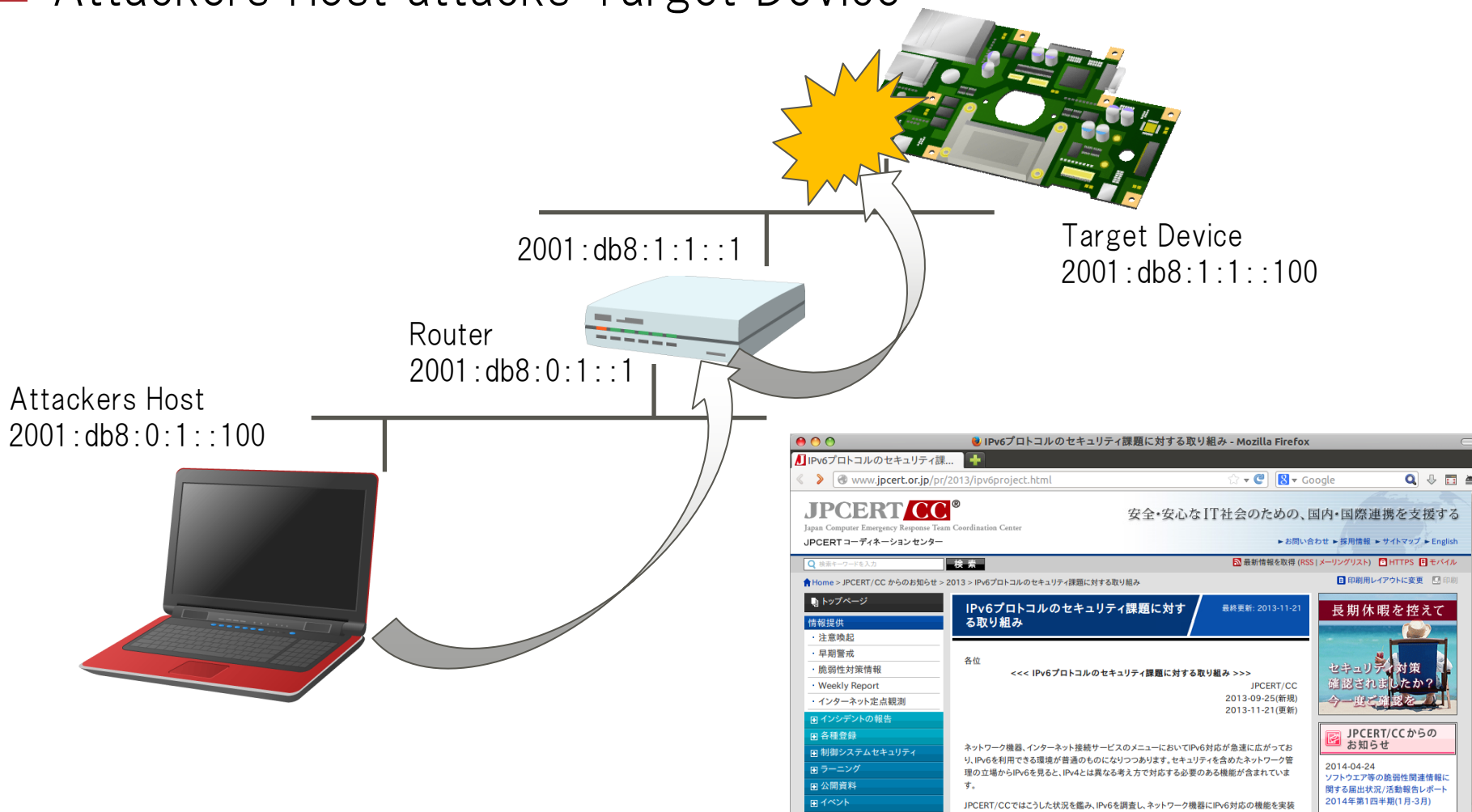
- IPv6 Ready Logo Conformance Test
- IPv6 Security Test

# Transition of Vulnerability of Kernel



*<http://nvd.nist.gov>*

- IPv6 Security Test Distributed by JPCERT CC
- Attackers Host attacks Target Device




<http://www.jp-cert.or.jp>

# Results of IPv6 Security Test

No.	Summary	Result
2013-ipv6sec-0001	Disabling the type 0 routing header processing	Pass
2013-ipv6sec-0002	DoS attacks on the router by hop-by-hop options header	Pass
2013-ipv6sec-0003	Implementation in Jumbo payload options available	Pass
2013-ipv6sec-0004	Corresponding complete overwrite packet information by unauthorized fragment header overlap-first-zero fragmentation	Pass
2013-ipv6sec-0005	Corresponding complete overwrite packet information by unauthorized fragment header overlap-last-zero fragmentation	Pass
2013-ipv6sec-0006	Corresponding portion overwrites packet of information by unauthorized fragment header1 overlap-first-hop fragmentation	Pass
2013-ipv6sec-0007	Corresponding portion overwrites packet of information by unauthorized fragment header2 overlap-last-hop fragmentation	Pass
2013-ipv6sec-0008	Confirming implementation of DoS attack tiny fragment using a tiny fragment header	Pass
2013-ipv6sec-0009	Tiny fragment of a DoS attack a large amount of using the small fragment header	Pass
2013-ipv6sec-0010	DoS attacks due to transmitting only the first fragmented packet	Pass
2013-ipv6sec-0011	Confirming implementation of Dos Attacks by Atomic Fragment	Pass
2013-ipv6sec-0012	Dos Attacks by Atomic Fragment	Pass
2013-ipv6sec-0013	Attack from the off-path attacker by fragment ID prediction	Pass
2013-ipv6sec-0014	DoS attacks to the router using the neighbor discovery service	Pass
2013-ipv6sec-0015	The DoS attack by sending large number of bad packets to a router	Pass

- 3.10-LTSI (also 3.10) COULD NOT be certified for IPv6 Ready Logo
- I'm investigating the cause of IPv6 Ready Logo Problems, and I will report to Next Workshop!  
I need contact with networking maintainer
- All of IPv6 Security Tests are Passed
- Security Tests are needed Continuously



**FUJITSU**

shaping tomorrow with you