

# JPRS activities on monitoring and measurement of JP DNS and the registry system

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DNS SSR Symposium in Kyoto  
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# 0. Purpose of this presentation

## [Purpose]

This presentation is intended to introduce the activities of monitoring and measuring of .JP DNS and the registry system. And to make the info as one of the explanation of the “DNS Health”, as the theme of the Symposium.

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(\*)some of the information in this presentation is not in public

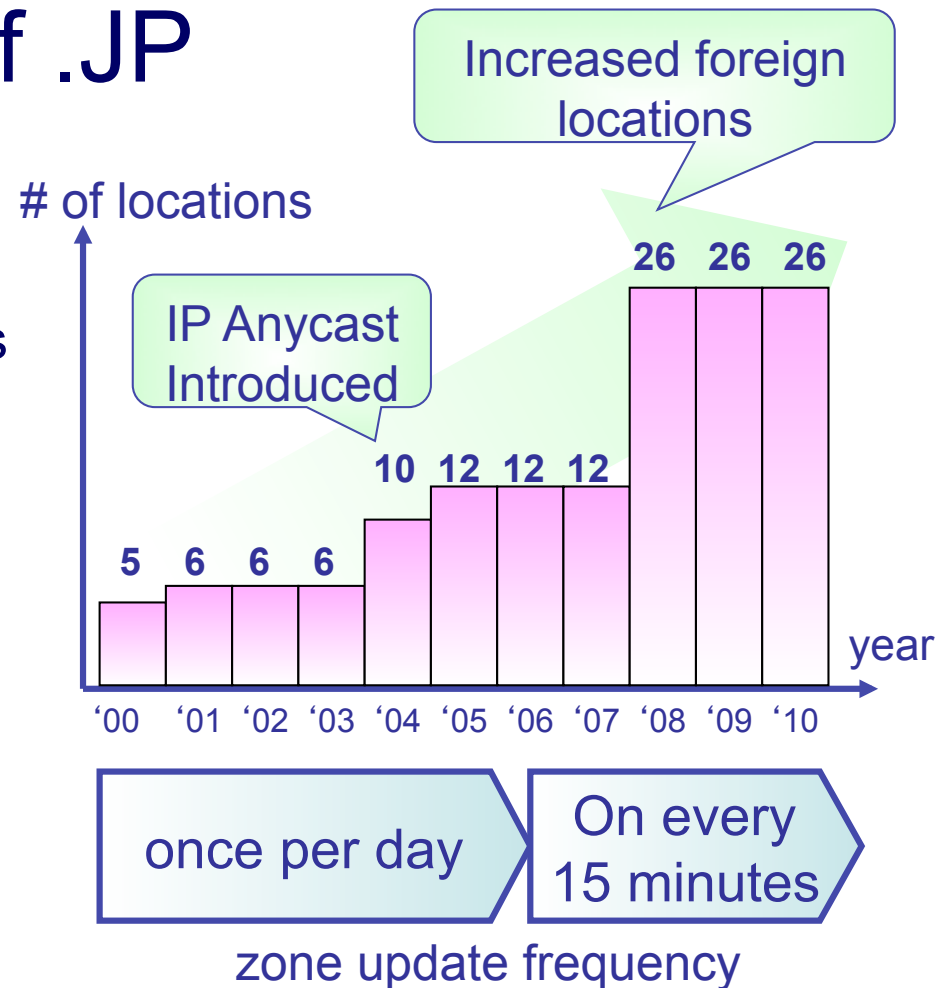
# 1. Introduction of .JP

## ■ .JP registry system

- 1.1+ million domains registered
- Zone updated on every 15 minutes

## ■ JP DNS


- 7 Nameservers ( [a-g].dns.jp )
  - ✓ 26 locations around the world, by IP Anycast technology
- Operated by 5 different organizations
  - ✓ JPRS(a, c, g), JPNIC(b), IJ(J)(d), WIDE(e), NII(f)



From next slide, how JPRS think of “DNS Health” is described, with some examples of what .JP actually measure and monitor for.

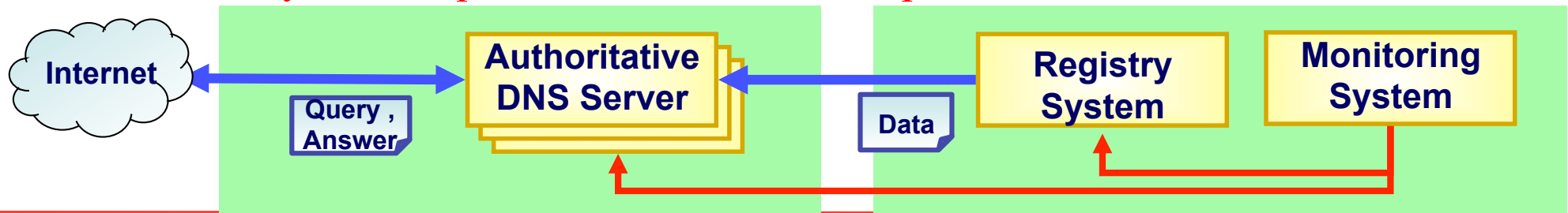
## 2. Meaning of “Health”

What is the meaning of “Health”? How to keep “Health”? By comparison with human and DNS,...

Target	Health	Prevention (to keep health)	Examination (to know health)
Human	Keep away from disease. etc.	Make tough body, by moderate exercise	Perform weight check, blood examination and others, and provide diagnosis
DNS 	Keep responding to queries with correct data. etc.	Build tough system, by successful technology, servers. Periodical zone transfers. etc.	Perform measurement and monitoring of the system, and analyze the results

(1) Keep responding to queries, by reliable platform.

(2) Keep data synchronized, by periodical zone transfers.



### 3. Materialize the items on “DNS Health”

#### Relative Value, Absolute Value




Quantify the “health” to enable measurement of its status. Value can be Relative Values, which need to be adjusted by empirical rules, and Absolute Values, which need to be adjusted by the scale of infrastructures.

#### Prevention



Introduction of the successful technology to suppress the anomaly state, and/or preparation to the anomaly state.

#### Examination

Monitoring and/or measuring for early detection of anomaly state.

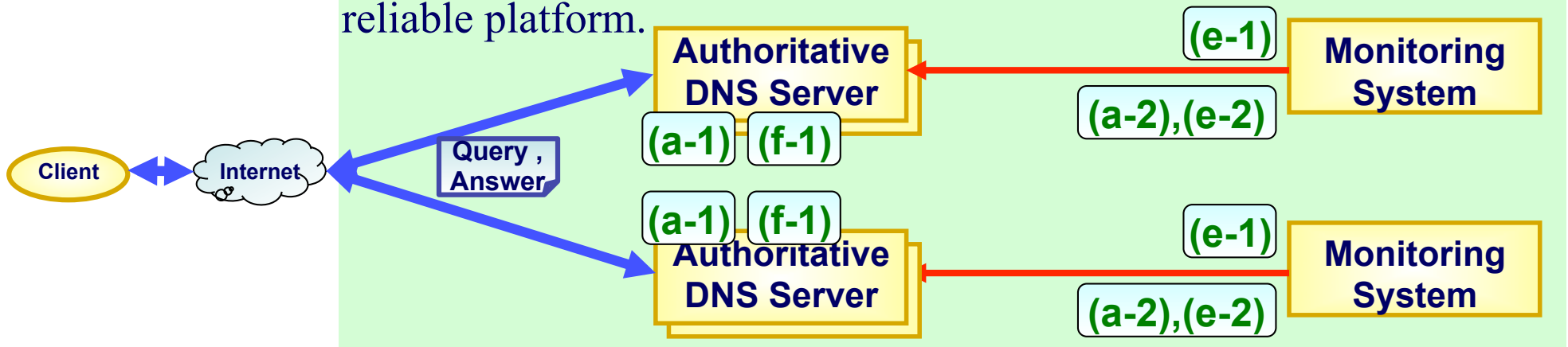
Target	Health	Prevention	Examination
<b>DNS</b> 	(1) reliable platform (2) Successful periodical zone transfers	Introduce the measures to suppress the anomaly state	Early detection of anomaly state
<b>Relative Value</b> 	ex) n% of DNS server locations must not stop responding to the queries at once.	Introduce IP Anycast technology to increase the node locations. Etc.	Availability check of each DNS servers. Etc.
<b>Absolute Value</b> 	ex) zone transfer must not fail n times in a row.	Place multiple master servers, in distributed locations. Etc.	SOA update check. Etc.



## 4. Prevention and Measuring/Monitoring in JP

	DNS Health	Prevention	Examination
<p>Relative Value</p> 	<p>(a) More than 80% of DNS server locations must keep running</p> <p>(b) Performance degrade of DNS servers must not happen to more than 50% of the servers at a time.</p> <p>(c) amount of zone changes in single operation must be less than 50% of its original size</p>	<p>(a-1) obtain 20+ locations for DNS servers</p> <p>(b-1) Divide DNS servers in 2 groups and conduct AXFR with a time lag</p> <p>(c-1) Save old zone file, and prepare for the emergency operation</p>	<p>(a-2) check host availability of all locations</p> <p>(b-2) count the number of silent locations by DNS service availability check</p> <p>(c-2) check the zone file size, and stop update if needed.</p>
<p>Absolute Value</p> 	<p>(d) Data update, provided in every 15 minutes, must not fail 12 times (3 hours) in a row.</p> <p>(e) Oversea locations must not stop responding the queries for more than 1 hour.</p> <p>(f) Use multiple HW/OS/SW platform</p>	<p>(d-1) Place multiple master servers, in distributed locations.</p> <p>(e-1) Provide monitoring from multiple routes.</p> <p>(f-1) Use BIND9+Other SW, Linux+Solaris, etc.</p>	<p>(d-2) Monitor SOA serial increase</p> <p>(e-2) check host availability of all locations</p> <p>(f-2) Check the security related information</p>

## 5. “DNS Health” in JP (query response)

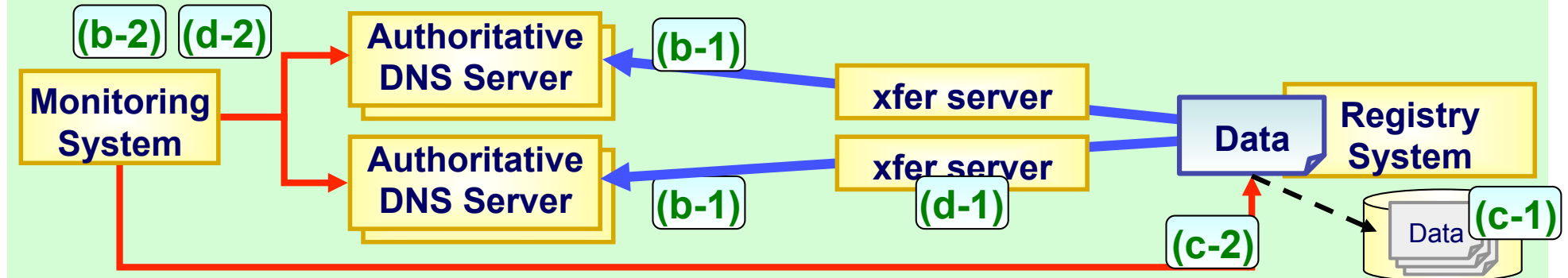
(1) Keep responding to queries, by reliable platform.





	DNS Health	Prevention	Examination
<b>Relative Value</b> 	(a) More than 80% of DNS server locations must keep running	(a-1) obtain 20+ locations for DNS servers	(a-2) check host availability of all locations
<b>Absolute Value</b> 	(e) Oversea locations must not stop responding the queries for more than 1 hour. (f) Use multiple HW/ OS/SW platform	(e-1) Provide monitoring from multiple routes. (f-1) Use BIND9+Other SW, Linux+Solaris, etc.	(e-2) check host availability of all locations (f-2) Check the security related information

## 6. “DNS Health” in JP (zone transfer)

(2) Keep periodical zone transfers successfully, and data be synchronized.

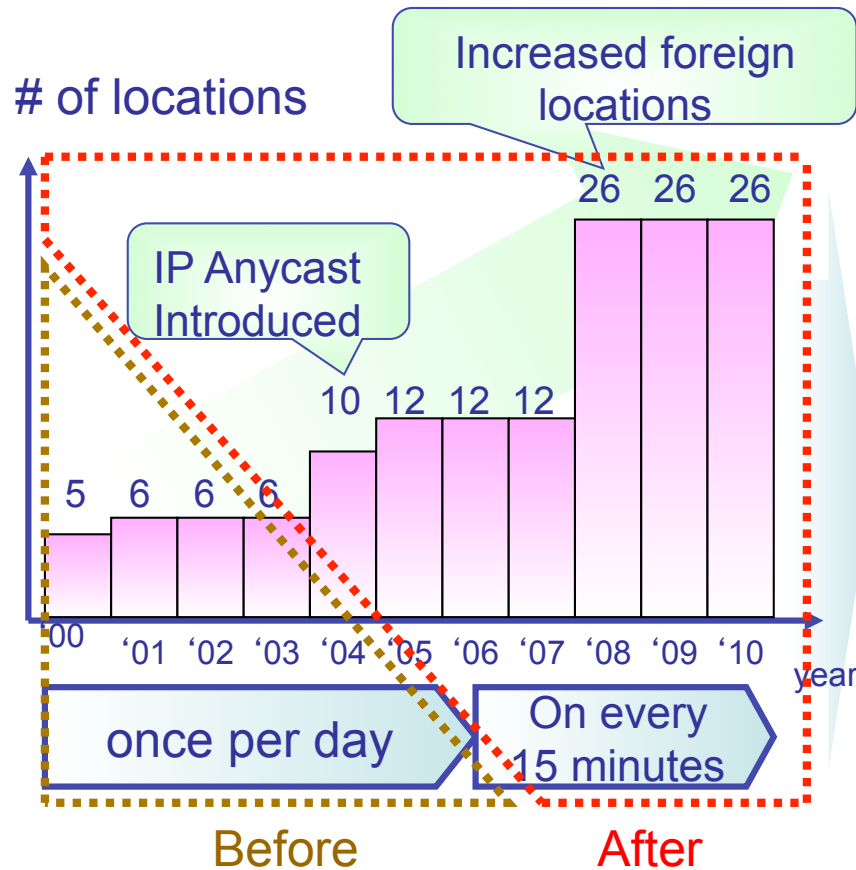


	DNS Health	Prevention	Examination
<b>Relative Value</b> 	(b) Performance degrade of DNS servers must not happen to more than 50% of the servers at a time. (c) amount of zone changes in single operation must be less than 50% of its original size	(b-1) Divide DNS servers in 2 groups and conduct AXFR with a time lag  (c-1) Save old zone file, and prepare for the emergency operation	(b-2) count the number of silent locations by DNS service availability check (c-2) check the zone file size, and stop update if needed.
<b>Absolute Value</b> 	(d) Data update, provided in every 15 minutes, must not fail 12 times (3 hours) in a row.	(d-1) Place multiple master servers, in distributed locations.	(d-2) Monitor SOA serial increase



# 7. Relative / Absolute Value



The values must be readjusted, once the system scale (# of locations) and/or service requirements (update frequency) have been changed.



	Before adjustment	After adjustment
<b>Relative Value</b> 	➤ Comparison of zone file size (threshold value was set to 50% for the AXFR once per day)	➤ Comparison of zone file size (threshold value kept 50% even if the frequency of update changed to 100 times more)
<b>Absolute Value</b> 	➤ Threshold value is set to 5 minutes: most locations were in-country. (short RTT place)	➤ Threshold value was changed to 1 hour: Readjusted, due to increase of foreign locations

## 8. Issues in the field

Preparation for disease can be done, but you cannot completely avoid becoming sick...

	DNS Health	Prevention	Examination
<b>Relative Value</b> 	amount of zone changes in single operation must be less than 50% of its original size	Save old zone file, and prepare for the emergency operation	check the zone file size, and stop update
issue	Amount of updates vary, and threshold is not easy to set	It is not easy to standardize and/or decide which zone file to be used for recovery	There is no good measure to change threshold value dynamically.
<b>Absolute Value</b> 	Data update, provided in every 15 minutes, must not fail 12 times (3 hours) in a row	Place multiple master servers, in distributed locations.	Monitor SOA serial increase, and alert to operators
issue	If one location fail, is it really a failure?	It is hard to decide appropriate locations, and which routes to be used	Monitoring via Internet make numbers of misinformations

## 9. Summary, Q&A

### ■ Summary

- Introduced JPRS thoughts and illustrations of “DNS Health”
- What is the reality on JP?
  - ✓ The outline introduced in this presentation is what JPRS thought after the implementation of the monitoring and measuring. The reality of the monitoring and measuring is not simple. There are many issues and difficulties like what it said in the previous slide.
- This symposium is a good opportunity to think of “Health”

### ■ Questions??