



**International Civil Aviation Organization**

**THE EIGHTH MEETING OF AERONAUTICAL  
TELECOMMUNICATION NETWORK (ATN)  
IMPLEMENTATION CO-ORDINATION GROUP  
OF APANPIRG (ATNICG/8)**

Jakarta, Indonesia, 18 - 21 March 2013



Ministry Of Transportation  
Republic of Indonesia

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**Agenda Item 4: IPS Transition**

**THE NETWORK SERVICE TO BE USED FOR AMHS IN JAPAN**

(Presented by Japan)

**SUMMARY**

This paper presents to describe a recommended network service for AMHS utilized IP network by Japan.

**1. INTRODUCTION**

1.1 Japan Civil Aviation Bureau is planning toward implementation to renewal AMHS in 2015. On the other hand, it is required the suitable circuit to improve current issues which are the movement to use the IP technology and cost-effectiveness. For the way to solution of these issues, this paper introduce the study to implement IP-VPN and the plan to utilize it for the renewal AMHS.

**2. DISCUSSION**

2.1 This study is based on the item 2.3 of ATNICG WG/11-WP/7 in Bangkok, Thailand in September 25-28, 2012.

2.2 Currently, the Aeronautical Fixed Telecommunication Network (AFTN) and Air Traffic Service Message Handling System (AMHS) provide these functions based on point-to-point international leased circuits in the Asia/Pacific Region.

2.3 From the economical point of view, IP based virtual private network (IP-VPN) services can be strong candidates for the future AMHS since they are meshed network and therefore do not need the number of access circuits for the corresponding point-to-point international leased circuits.

2.4 There are two types of IP-VPN services in the world. They are Internet VPN using the public Internet and MPLS based IP-VPN (hereinafter called "Global IP-VPN" using private telecommunications network. Please see **the Attachment 1**.

2.5 From the point of view of security, Global IP-VPN is recommended since it is designed to deliver a secure, private any-to-any service over a dedicated Multi-Protocol Label Switching (MPLS) network.

2.6 With regard to contracts with telecommunication providers, currently each country representative has each contract with each country provider for point-to-point international lease circuit service on a bilateral basis. On the other hand, a single telecommunication provider having a closed IP-VPN network will be selected for Global IP-VPN in the Asia/Pacific region. The state representative to make a contract with the provider will be a main contractor.

2.7 At this stage Japanese Civil Aviation Bureau has a plan to make a contract with a leading international service company in Japan, and underlined by over fifty years of providing international services, e.g., KDDI Corporation.

2.8 Under a meshed any-to-any network, Global IP-VPN service, multi local access circuits for the existing point-to-point international leased network will be integrated into a single local access circuit in each country. Therefore, if a failure happens on the single local access circuit for Global IP-VPN, all traffic connecting to the corresponding country will be cut off. In order to avoid such situation, redundancy for more secure network should be considered. The ways would be to prepare a backup local access circuit (another provider is desirable) or prepare another IP-VPN network.

2.9 Attached please see the **Attachment 2** for a general description of IP-VPN and KDDI.

### **3. ACTION OF JAPAN IN THE FUTURE**

Japanese Civil Aviation Bureau would like to forward the following migration plan for AMHS toward the renewal of 2015:

3.1 For more secure migration, after the existing AMHS connection with the United States would be coordinated to migrate to an AMHS connection based on IP-VPN, the existing point-to-point circuit will be migrated to a new IP-VPN network.

3.2 For more efficient network operation, the new IP-VPN network will be used from the start to connect with the AMHS in each state.

### **4. ACTION BY THE MEETING**

4.1 The meeting is invited to:

- a) note and review the contents of this working paper; and
- b) review and provide migration plan for the AMHS connection with Japan toward the renewal of 2015.

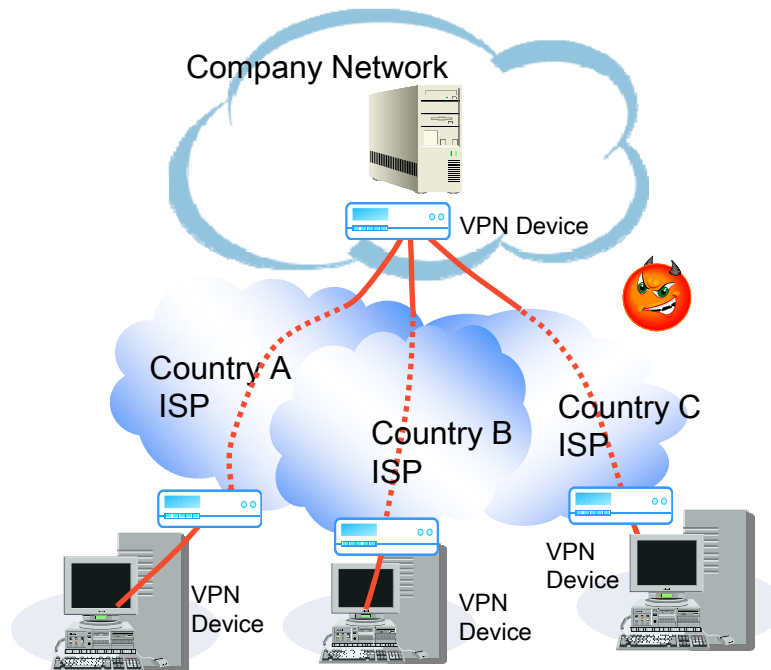
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# Comparison of Internet VPN & IP-VPN

1

## Internet VPN

Internet VPN constitutes the Customer's own VPN Network that safely uses the public internet, by performing End-to-End encryption and decryption,

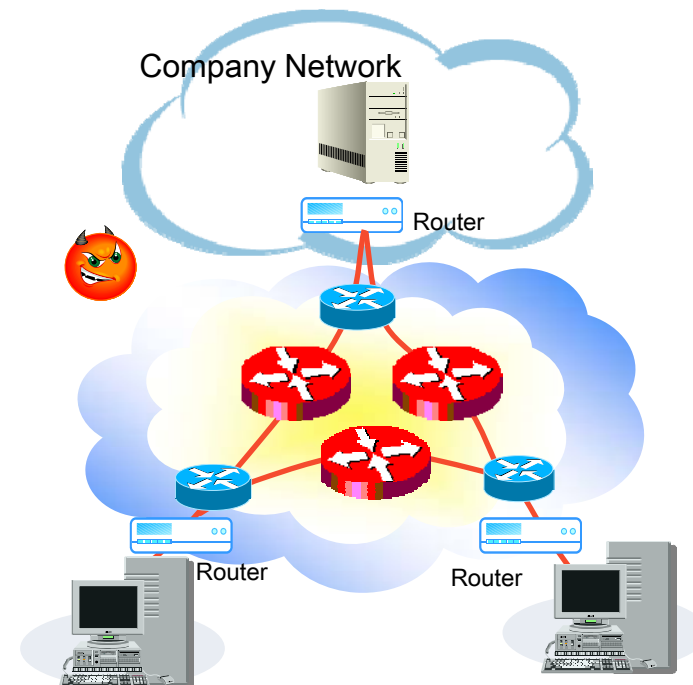


### Internet Network

- Concentration of various ISP
- There are no specific routes, and the composition is complex with the involvement of ISPs of multiple countries.

## IP-VPN

IP-VPN is a commercial service that uses the VPN Network prepared by the Communications Carrier.



### IP-VPN Network

- A secure Network provided by KDDI.

# Comparison of Internet VPN & IP-VPN.

Internet VPN		IP-VPN
General Internet Network	Network Composition	Closed IP-Network of Communications Carrier
Low Cost	Communications Cost	Relatively High Cost
Receives adverse influence of internet access traffic.	Traffic	Measures in place such as securing Customer's contracted bandwidth. Configured so there is no congestion during periods of high traffic.
Dependence on the encrypting functions of the VPN Equipment.	Security	KDDI Network specifically designed for the Customer.
Occasional Suspension of Service, and fault isolation is difficult.	Circuit Reliability	Availability and network latency is Secured. Early restoration is enabled even during faults.

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# *KDDI Global IP-VPN*

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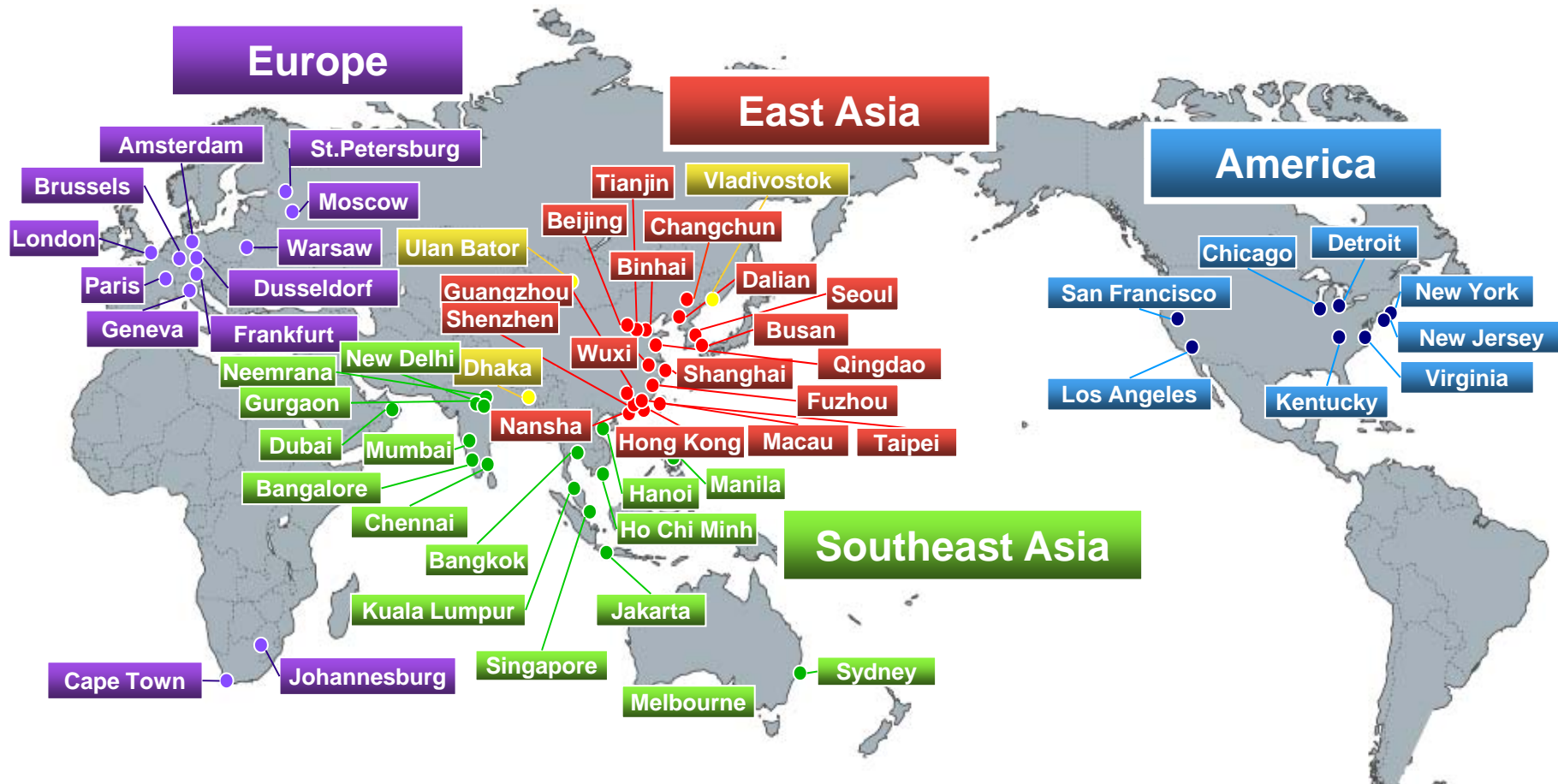
**KDDI Corporation**



*KDDI provides seamless networks to over  
150 countries and regions*

***KDDI Global IP-VPN***

\* We have established experience of deploying and implementing services in countries in Africa, Middle East, and South America where it is said that the infrastructure is relatively underdeveloped.

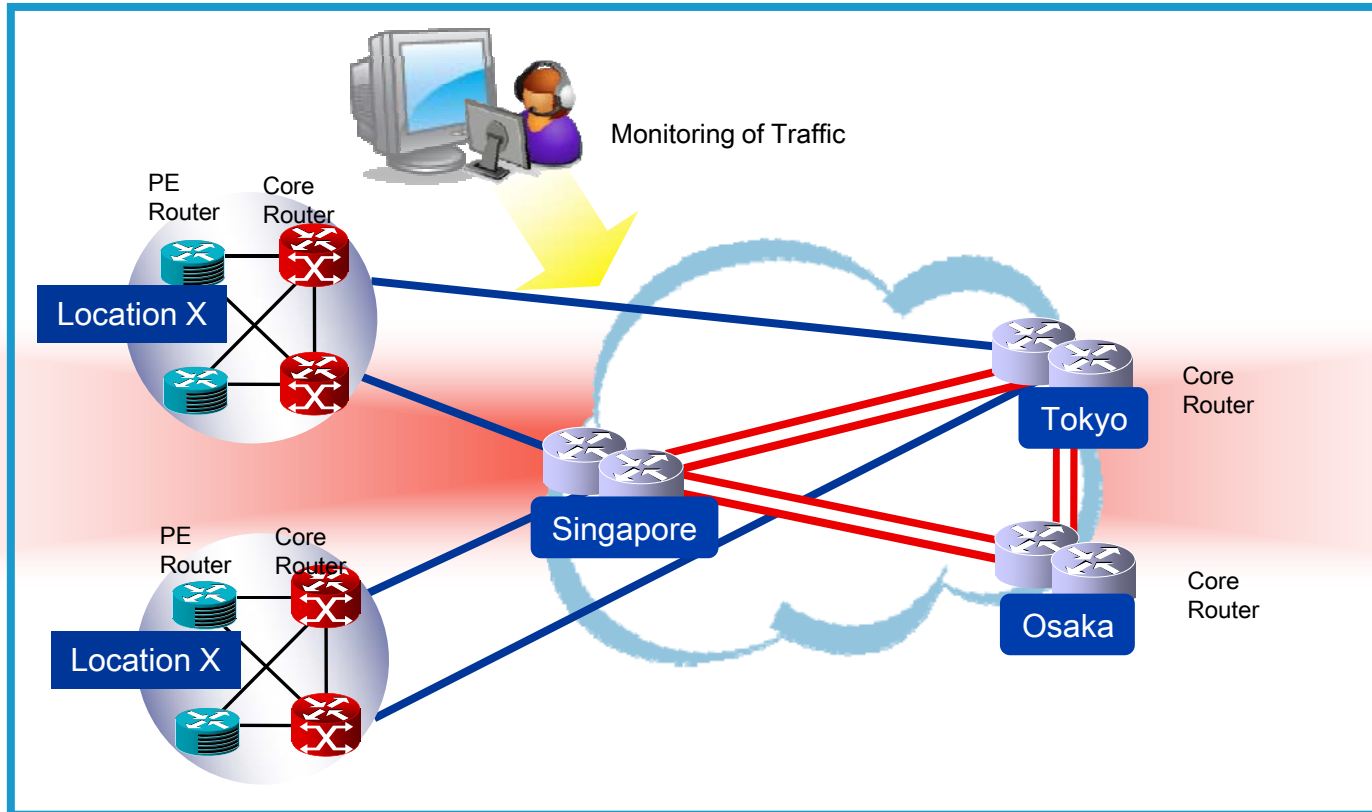


KDDI's 3,000 employees in 87 Overseas Offices located in 56 cities, 24 Countries and Regions supports your global business

as of Sep, 2010

High quality network underlined by over 50 years experience in providing Global Services.

Global IP-VPN connectivity policy is to provide highly reliable service. A Backbone network free of congestion is provided by monitoring traffic at each relay circuit, and by configuring appropriate bandwidth.

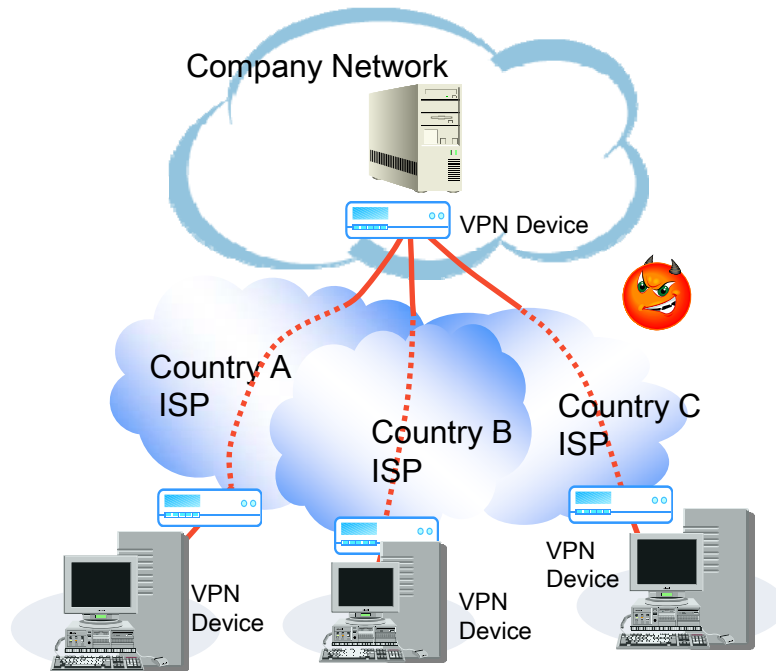






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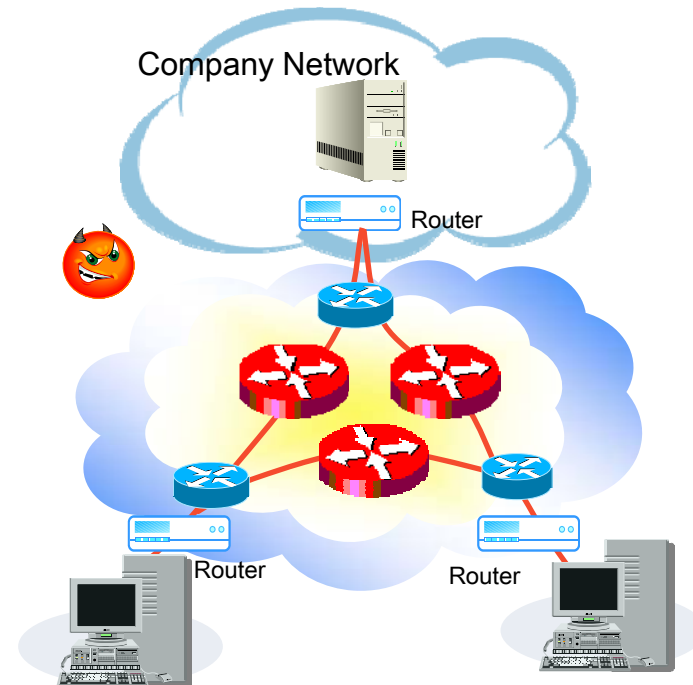


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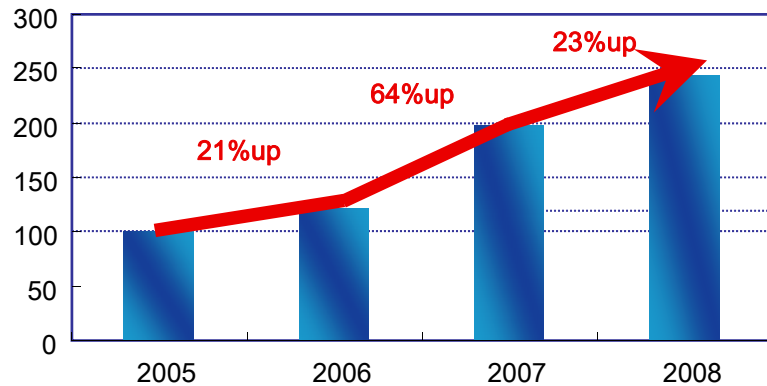
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## KDDI thoroughly supports Customers all the way up to Circuit Activation

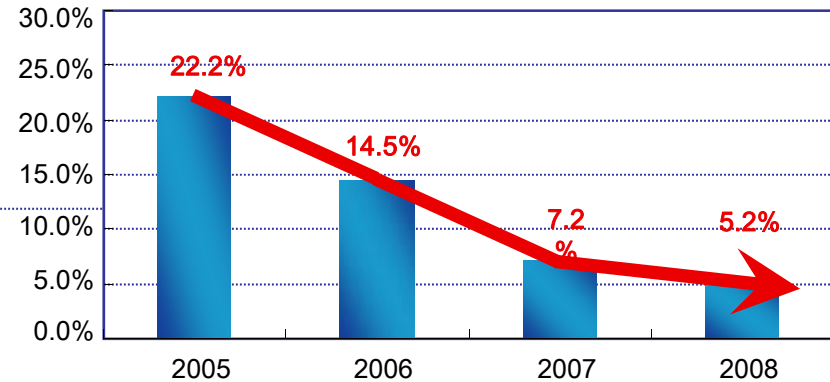
KDDI conducts activities to improve the observance of the Customer's requested ready for service (RFS) date. This enables the Customer to reach the requested ready for service date with peace of mind, even as they are overseas, where the circuit quality, business culture, are different from what Customers are accustomed to.

• **New Circuit Activation in China**



\* FY 2005 is fixed at 100.

• **Circuit Activation Delays in China**

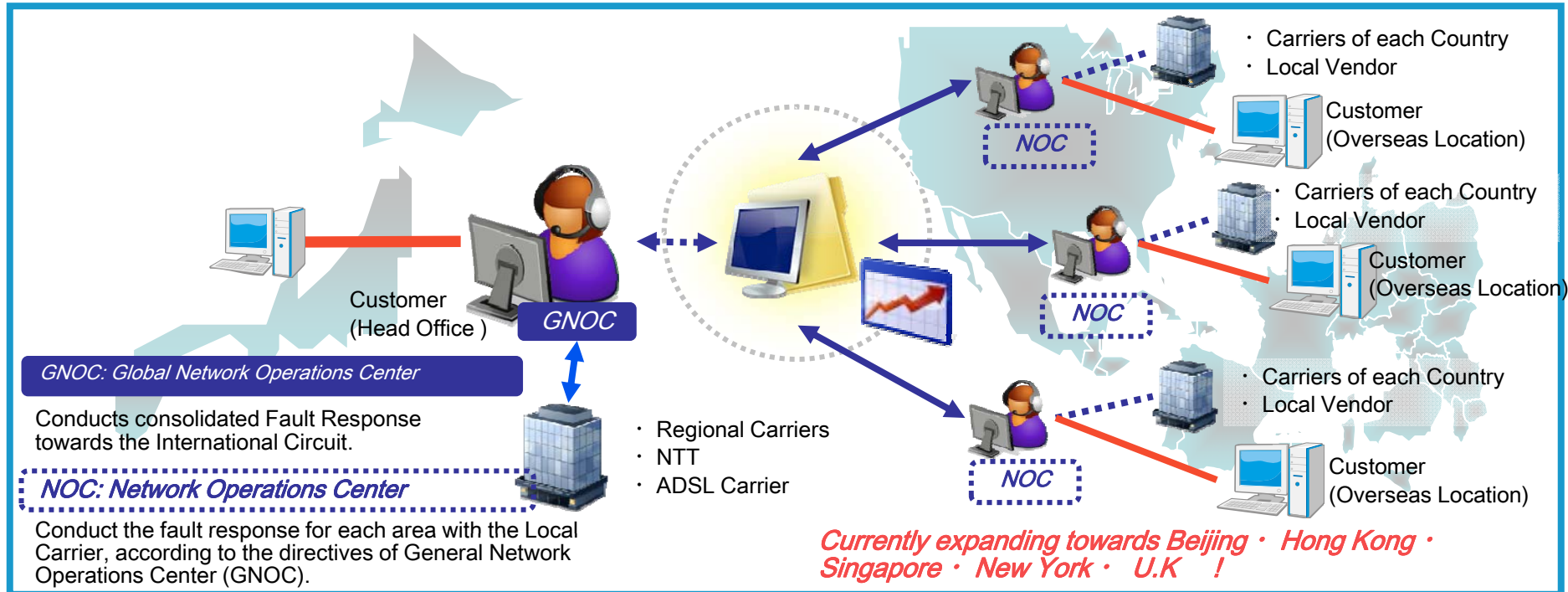


•This does not include the delay of circuit deployment due to reasons or convenience of the Customer.

**The Circuit Delivery Rate for all Circuits was over 99% in 2008.**

As a Japanese corporation, KDDI strictly observes and realizes Japan-quality Ready For Service dates. KDDI will continue to conduct improvement activities without being complacent with the numbers listed above.

## Provision of Japan-Quality Support to the Customer's Overseas Locations



- Front Operations

- Secondary Response Operations

- Facility Monitoring Operations
- Circuit Lease Operations

**Reception · Primary Isolation · Circuit Testing · Consolidation of Restoration · Operations · Progress · Restoration reports, etc.**

- Expert response for every service.
- Response to other communications carriers for end-to-end services including the access segment in circuit units.

**Creation of Reports · Customer Visitations · Consolidated Response to Large Scale Failures, etc.**

- Gather information from relevant departments & other carriers. Creation of reports that summarize the development of the response, cause, and the measures taken to prevent reoccurrence.
- Consolidation of Restoration efforts in the occurrence of a large scale fault.

**Facility Monitoring · Consolidated Operations · Network Measures, etc.**

**Notification of Design Construction, Customer Adjustments.**



### Reliable Support Formation through Powerful Carrier Relations



*Pacific Partners Meeting*

In the 1990s a multi carrier forum was jointly held by representatives of several communications carriers of various countries of the Asian Pacific Rim\* for the purpose of improving International Communications Services, and these joint carrier conferences continue to this day.

\* KDDI,AT&T,CT,CHT-I,KT,CAT,SingTel,Indosat,REACH,TNZI



**India VSNL:** Direct meeting with operations staff of VSNL India to request for the improvement of service quality.

- As a flagship carrier representing Japan with a long history of providing international telecommunications, KDDI possesses **potent relationships** with carriers of various countries.
- These Carrier relations span widely from individuated exchanges with separate carriers of various countries to multi-carrier forums such as the **Pacific Partners Meeting**, and have led to concrete results ranging from product development to operations.
- Strive to achieve Japanese quality service through efforts such as **the deployment of operations personnel to locations** in response to long lasting faults or multiple faults.
- The swift configuration of alternative routes of various carriers during the **Taiwan Strait earthquake** was enabled by powerful carrier relationships with overseas carriers.



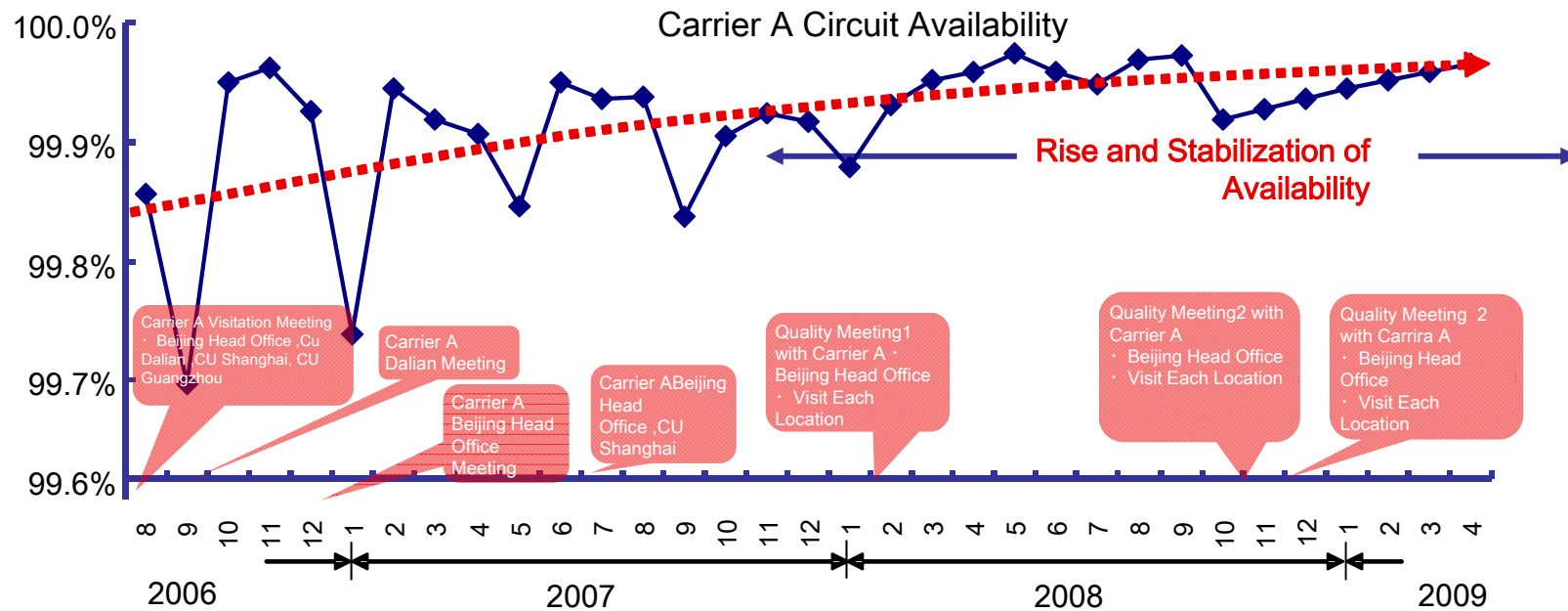
**Yantai CNC:** Conducting a meeting for quality improvement directly with the Local Branch of CNC in China.

## Performance of KDDI Quality Improvement Activities (Example of China)

Improvement measures in China where the provision of stable service is made difficult for reasons such as faults in the local circuit has been and continues to be conducted.

### Specific Improvement Activities

- ① Realization of swift and accurate transmission of information concerning local fault conditions through the employment of Chinese personnel at the KDDI International Operations Center (Tokyo), in addition to the deployment of operations support specialists to local KDDI Locations (Beijing, Shanghai, and Guangzhou).
- ② Strengthening relations by convening quality improvement meetings with the Chinese Carrier and Local Branches, performing regular telephone conferences, in addition to continuously and directly notifying improvement in contents.



\* At KDDI we continuously perform activities to improve the quality of our service with the carriers of each country.



### Cable Repair Ships

- "KDDI Ocean Link"
- "KDDI Pacific Link"

Possession and use of 2 cable repair ships. These two ships were deployed from Japan in 2007 as part of the effort to repair the cables in the aftermath of the Taiwanese Coast Earthquake.



### Undersea Robot

Conducts operations such as surveys of cable conditions and the point of failure down to a depth of 25,000M. The robot also excavates down to a depth of 3M to cut and conduct re-installation activities.

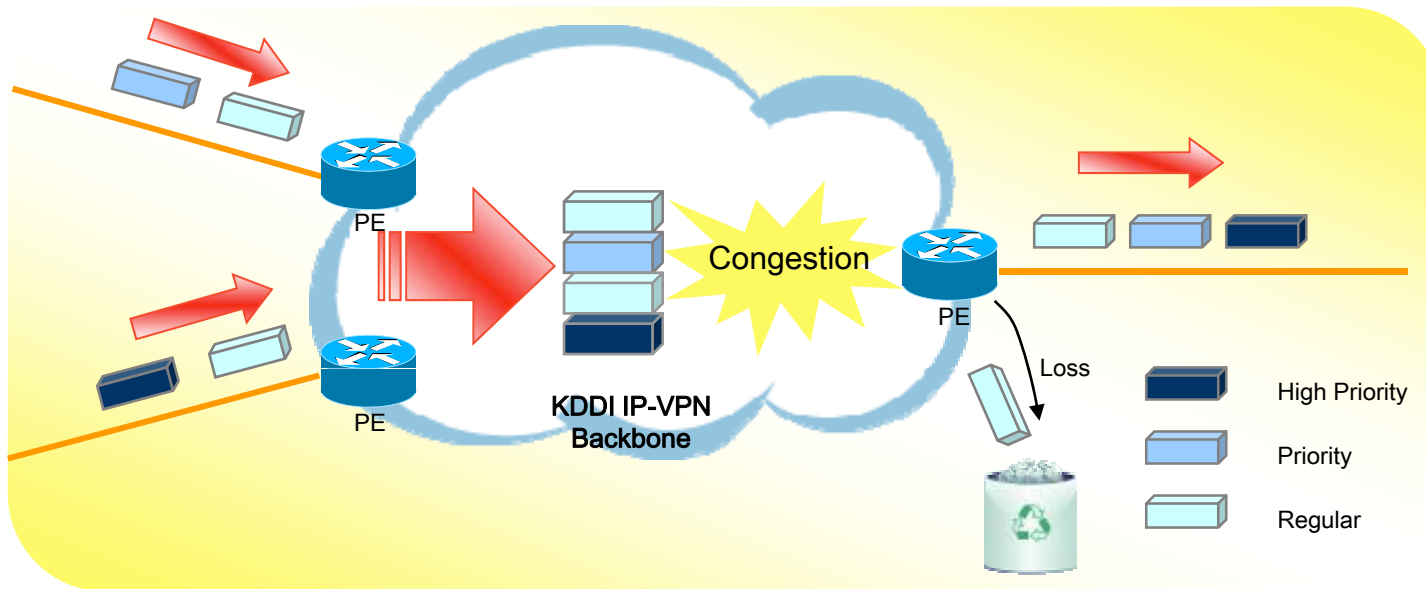
- The quality of the undersea cable will be determined by the undersea cable repair ship and the abilities of cable engineering. KDDI possess rich know-how that other carriers do not have, owing to years of experiences as a telephone and telegraph communications provider.
- Kokusai Cable Ship (KCS / International Cable Ship) is a 100% subsidiary of KDDI, and is among the worlds leading companies in the area of undersea cable installation and maintenance. KCS possesses experience in maintaining over 65,000km and installing 50,000km of cable throughout the Asia Pacific region for the past 39 years.
- KCS is distinguished as having deployed the only 2 ships sent from Japan, the KDD Ocean Link and the KDDI Pacific Link, in the restoration of cables during the Taiwanese Coast Earthquake.



Priority Regulation of Mission Critical Traffic

**QOS Service**

In the occurrence of congestion in the Customer's Access Circuit, vital traffic such as audio will be transmitted without loss through the transmission of traffic designated as high priority.



The congestion occurs at the out-bound side of the PE that is transmitted towards the Customer Access Circuit which is narrower in bandwidth vis-à-vis the wider bandwidth backbone.

(The Bandwidth is designed in the KDDI IP-VPN Backbone in a manner that does not allow for the occurrence of congestion.)

Consolidated Service by KDDI of everything until the installation of the CE Router in the Customer Premises.

## Router Management

KDDI shall not only provide the Network, but shall also provide services in a consolidated manner up to the installation of the CE Router at the Customer Premises. Through the combination of the Monitoring Service, KDDI is able to provide highly reliable network services that provides peace of mind even in the occurrence of a fault. Additionally, KDDI Local staff who possess a high degree of technical skill are deployed across the world, and support the construction of the Customer's network through a support formations of thorough quality.

## Japan Support Formation provided by KDDI

- Basic Design, Sophisticated Design
- Onsite Equipment Installation and Configuration Work by KDDI Technicians, Circuit Connection Work.
- Access Circuit Throughput Test
- Communications Confirmation Test of the Customer Locations Segment (LAN-LAN Segment).
- Separate Advanced Test such as those of the QOS, BGP, ACL Filter.
- Operations Confirmation Test Support of Customer Applications.



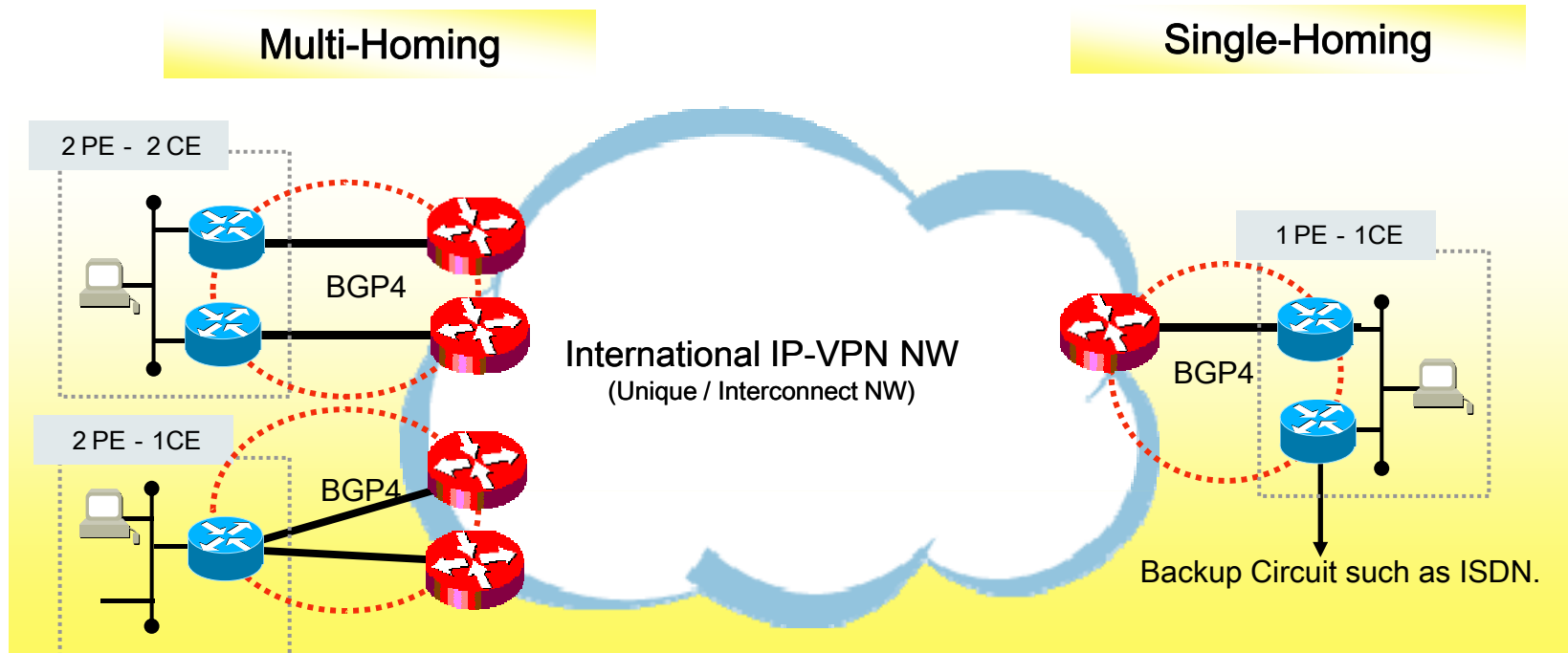
**K D D I supports the Customer until the delivery of services.**

•In addition to the full support menu mentioned above, KDDI has prepared a simplified commencement support menu.

## Realizing the backup of primary locations during faults, and the diversification of traffic routes.

Backup through ISDN using a Single-Homing (1 Line), and duplexing of the Access Circuit through Multi-homing (2 Line) is performed, enabling redundancy and route diversification by housing at a different PE.

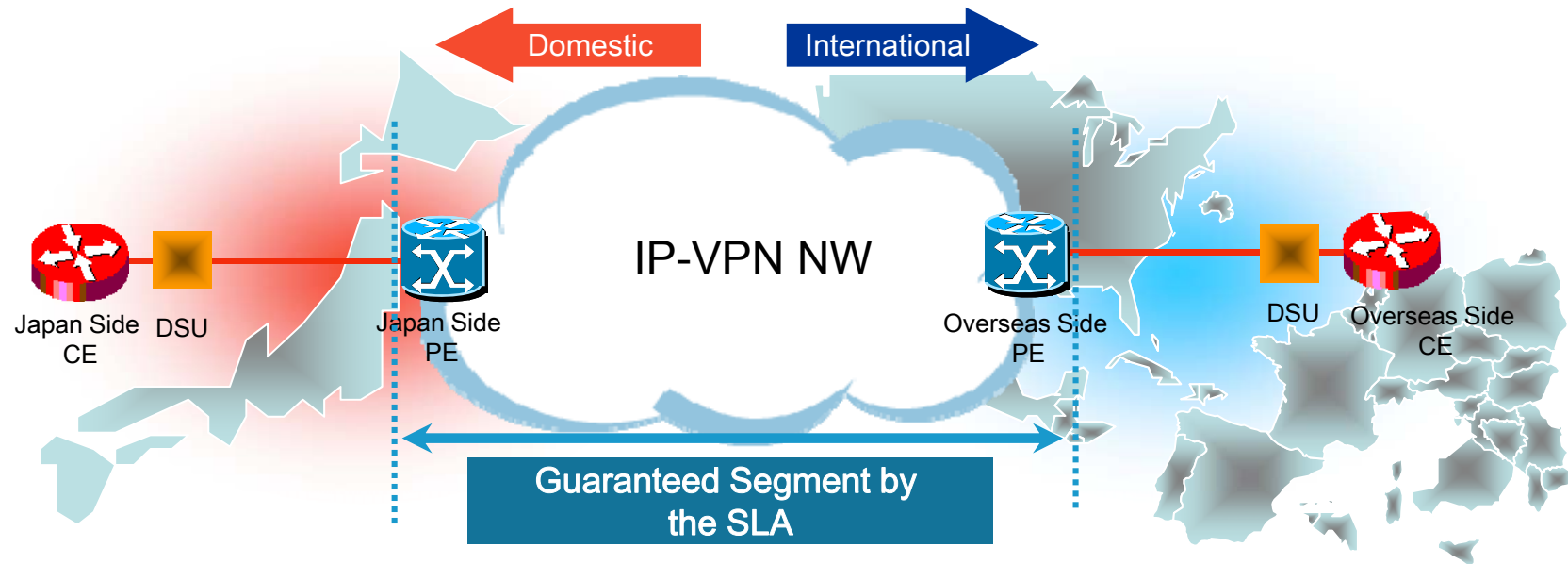
There have been several cases in which circuit redundancy using BGP4 is configured in order to enhance resilience against faults in India, China, and South East Asia where the occurrence of faults in the access circuit are particularly frequent.



Assuring the Customer provision of high quality services by securing the Industry's Highest Service Level.

The SLA is a service that assures the quality of the network, and Refunds a set charge in the case that the standard prescribed by the Company is not satisfied.

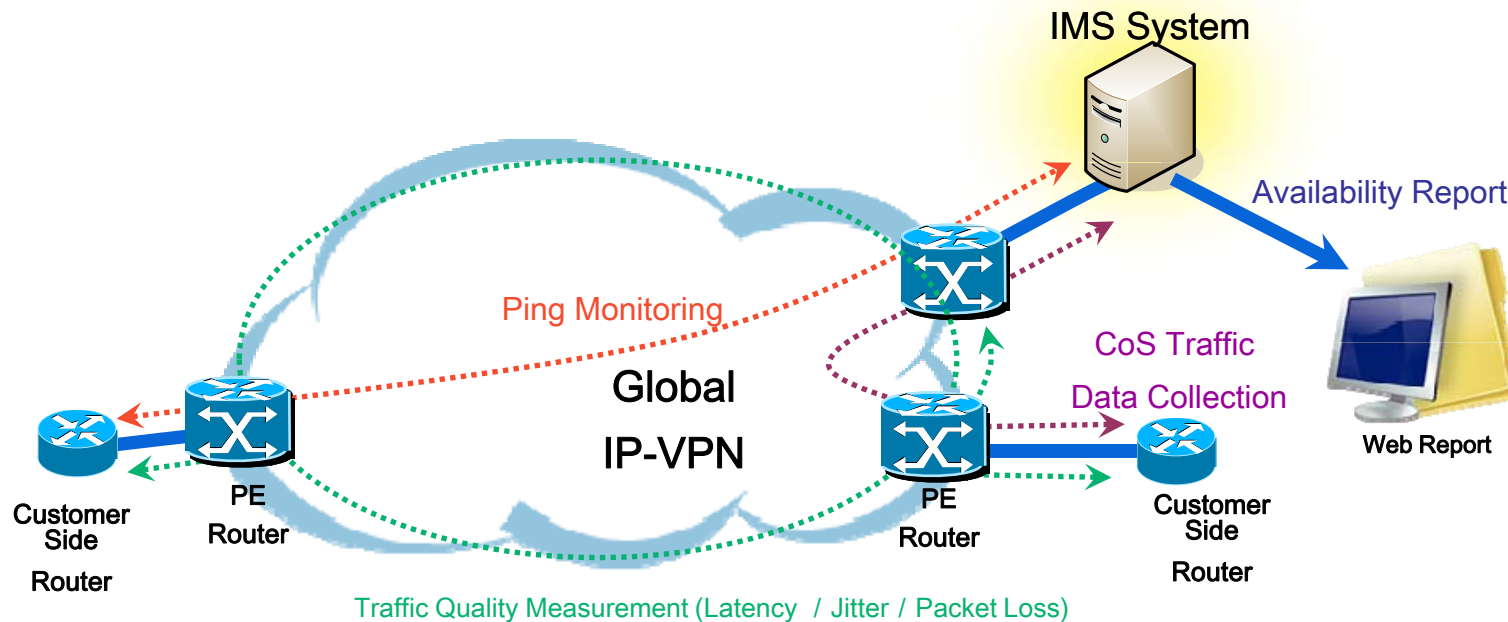
- **Monthly Availability Rate** : KDDI assures that the KDDI Network is regularly available for use, and in the event that the availability rate for a single month is less than 99.999%, the Company shall return a portion of the monthly usage charge for that month corresponding to the rate.
- **Average Network Latency Time** : Assures that the monthly average network latency of the entire KDDI International Backbone is or less than a fixed value.
- **Mean Time To Restoration (MTTR)** : Assures that the Mean Time To Restoration (MTTR), is, or is less than a fixed amount of time when there is a fault in the network of the Company.



Monitoring the Customer Network Condition & Real-time Notification

IMS (International Managed Service)

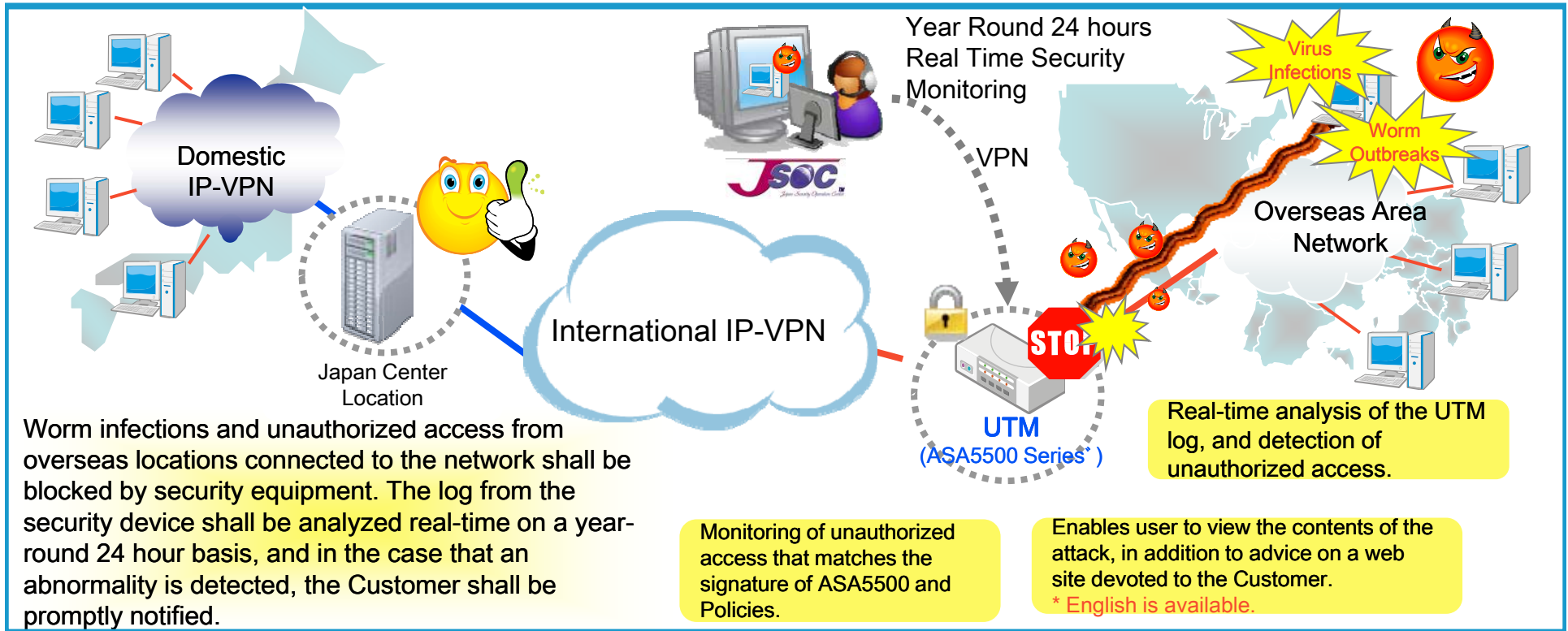
- Network Monitoring (Ping Monitoring, Availability Report)
- Traffic Report (COS Traffic, Quality, Router Resources)
- Provision of the Customer Portal Screen (Real-time Status)
- Alarm Notification (Mail Notification, Automated Voice Notification, Operator Response)



KDDI provides a variety of Services upon request from the Customer.

\* This is a charged option.

One Stop Provision of Security Monitoring · Operations Management for the Customer's Overseas Location



Security Monitoring Service to the Overseas Locations is provided in joint cooperation with the **LAC Corporation**.

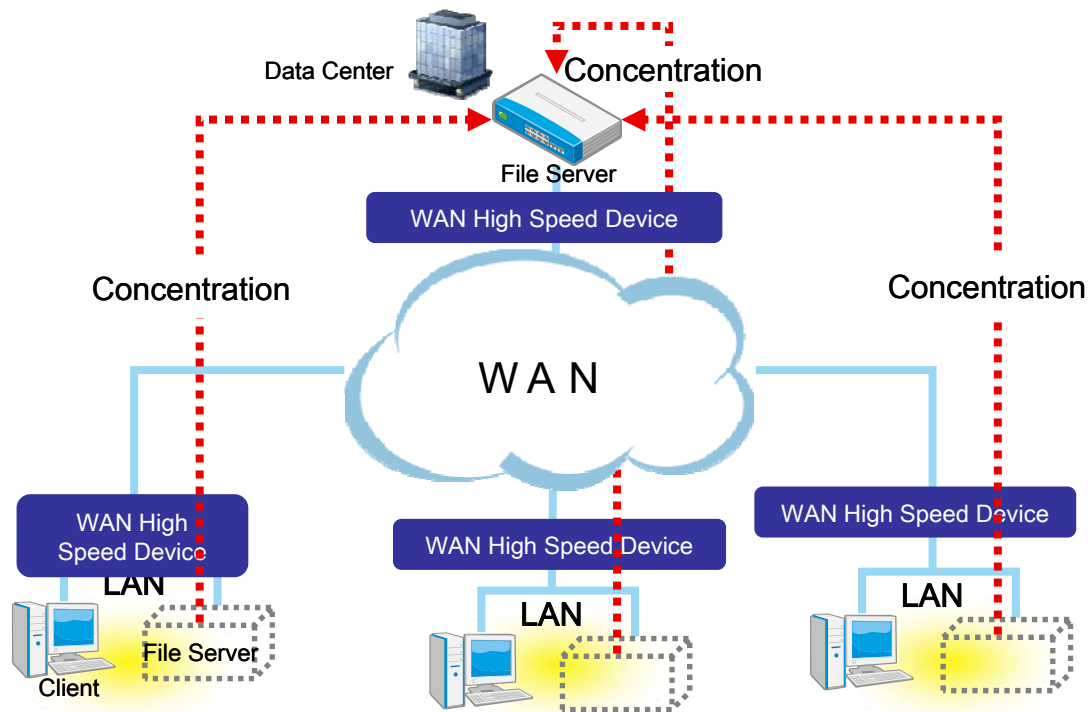


**JSOC: Japan Security Operation Center**

LAC is proud to present JSOC, the largest domestic remote security monitoring center. In using the “information,” “attack methods,” and “experience” collected by the Security Research Institution (CSL : Computer Security Research Center, DBSL : Database Security Lab) that is owned by LAC, JSOC supports the security operations that conducts actual processes and the provision of information for “what the Customer needs to do” at the navigation level, from the latest security information and the notification of the incidents.

## Realizing High Throughput without minding the advanced application or latency.

Enables the provision of an optimal WAN environment to the Customer, by preparing a function that optimizes the window size, data compression, or CIFS of the TCP.



The issue of the decline of through-put due to latency arises as a result of the concentration towards the data center of the server.



Realization of throughput on par with the level of the LAN environment is achieved through the implementation of the WAN High Speed Device.

**KDDI selects equipment that is optimal for the requirements of the Customer.**

\* Please be noted that this is a charged option.

Consolidated Provision of the Communications Environment from the Head Office to the Overseas Office and Factory



Along with the development of Companies abroad, the establishment of ICT Foundations is becoming increasingly important. In order to meet such requirements, KDDI shall provide seamless Global ICT Solutions that has the four ICT Services of Global Networking, System Integration, Data Center, and Overseas Area Network at its core.



## Full outsourcing of the Customer's vital IT Resource Management Overseas

In addition to the provision of high quality, and high reliability facilities overseas where uncertainties concerning power supply and security, we deploy technicians possessing high degree of skills on a 24 hour basis, protecting vital customer IT resources and supporting overseas operations.



### Stable Infrastructure Environment

The best in the aspects from power, climate control, security, and fire-extinguishing facilities has been arranged in the design stage to construct a stable infrastructure environment, enabling Customers to entrust their equipment and data to KDDI with peace of mind.



Through the formulation of the TELEHOUSE quality guideline, we are in the daily process of enacting the PDCA cycle.

### Industry's Top Operations Maintenance



Year-round 24 hour operations maintenance, training towards technicians, preparations of construction procedure handbook, planned facilities, system inspection, tests, amendment, and continuous learning of the requirements of the Customer. TELEHOUSE is always leading its competitors in the industry, and continuously pursuing the improvement of Customer satisfaction.

### Highly Reliable and Flexible Network

In addition to the KDDI Global Network Service, it is also easily connected with multiple local communications Carriers. Along with the expansion of business, not it is possible to flexibly and swiftly expand your network. Particularly in the U.S., it is relied on by over 500 Corporate Customers of the ICT Industry, with a primary focus on concentration on communications carriers and ISP.



### Maintaining good relations with Local Institutions.





TELEHOUSE has blended in with local society to the extent that it is receiving priority support from the police department, fire department, power companies, and industrial organizations. During the multiple terrorist attacks on American soil in 2001, Company personnel and those outside of the Company alike worked in unison to achieve the swift restoration of services.





As of Feb 2013

**USA**

-  **Los Angeles**
-  **New York Broadway**
-  **New York Teleport**
-  **New York Chelsea**

**South Korea**

-  **Seoul**

**Hong Kong**

-  **Hong Kong**
-  **Hong Kong CCC**

**Vietnam**

-  **Hanoi**

**Singapore**

-  **Singapore**


**UK**

-  **London Docklands East**
-  **London Docklands North**
-  **London Docklands West**
-  **London Metro**

**France**

-  **Paris Jeuneurs**
-  **Paris Voltaire**
-  **Paris Magny**


**Germany**

-  **Frankfurt**



**Turkey**

-  **Istanbul**





**Russia**

-  **Moscow**

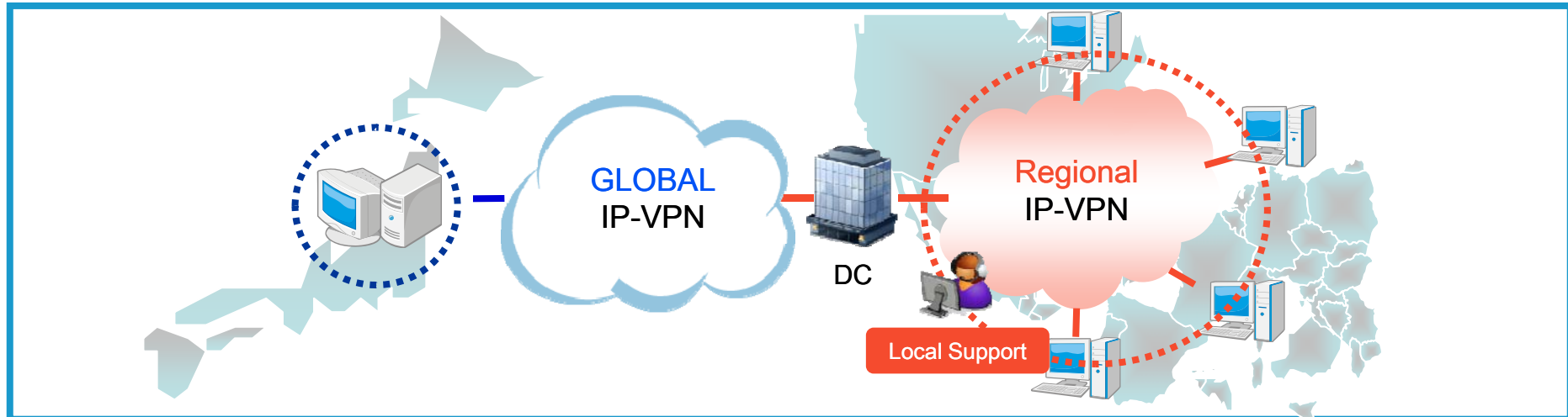
**South Africa**

-  **Cape Town**
-  **Johannesburg**

**China**

-  **Beijing**
-  **Beijing BDA**
-  **Shanghai Zhangjiang**
-  **Shanghai Jinqiao (Target Service in year 2013)**

## Overseas Area Network Managed Packed



Overseas Regional Network · Router · 24 Hour Active Monitoring can be ordered in a One-Stop manner.

Packaging of the Regional Network, CE Router, and Active Monitoring to coalesce multiple overseas locations.

- One Stop Billing and Shopping of low cost local services in Japan.

### Implementation

- Reduction of Implementation · Design Cost
- Reduce the risk of trouble
- Swift Implementation Enabled

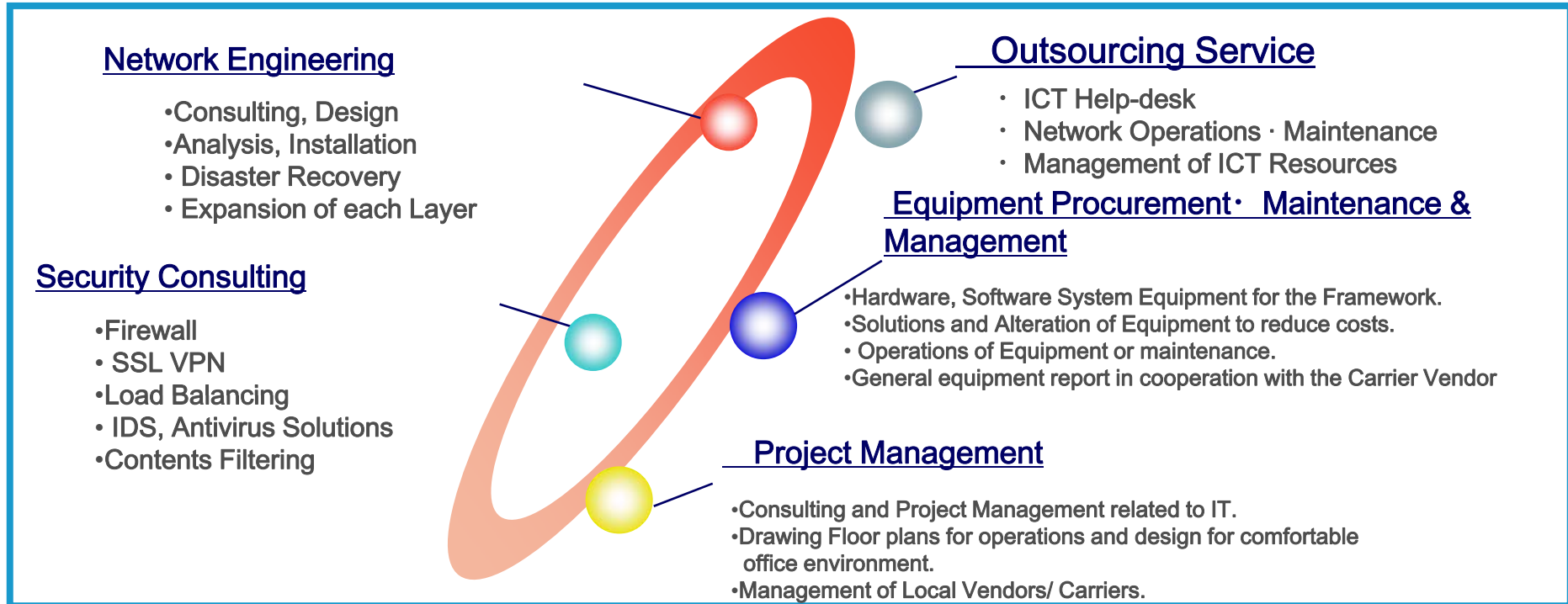
Simple implementation from the NW to the Router, and even monitoring.

### Trouble Occurrence

- Reduction of Trouble Time
- Vendor Arrangement Not Necessary
- Reduction of Operations Cost

- 24 hour active monitoring is enabled up to the router.
- One-stop speed solutions.

## Japan-quality Response from the Construction of Locations to the Relocation



### Rich Connections and Close Relations

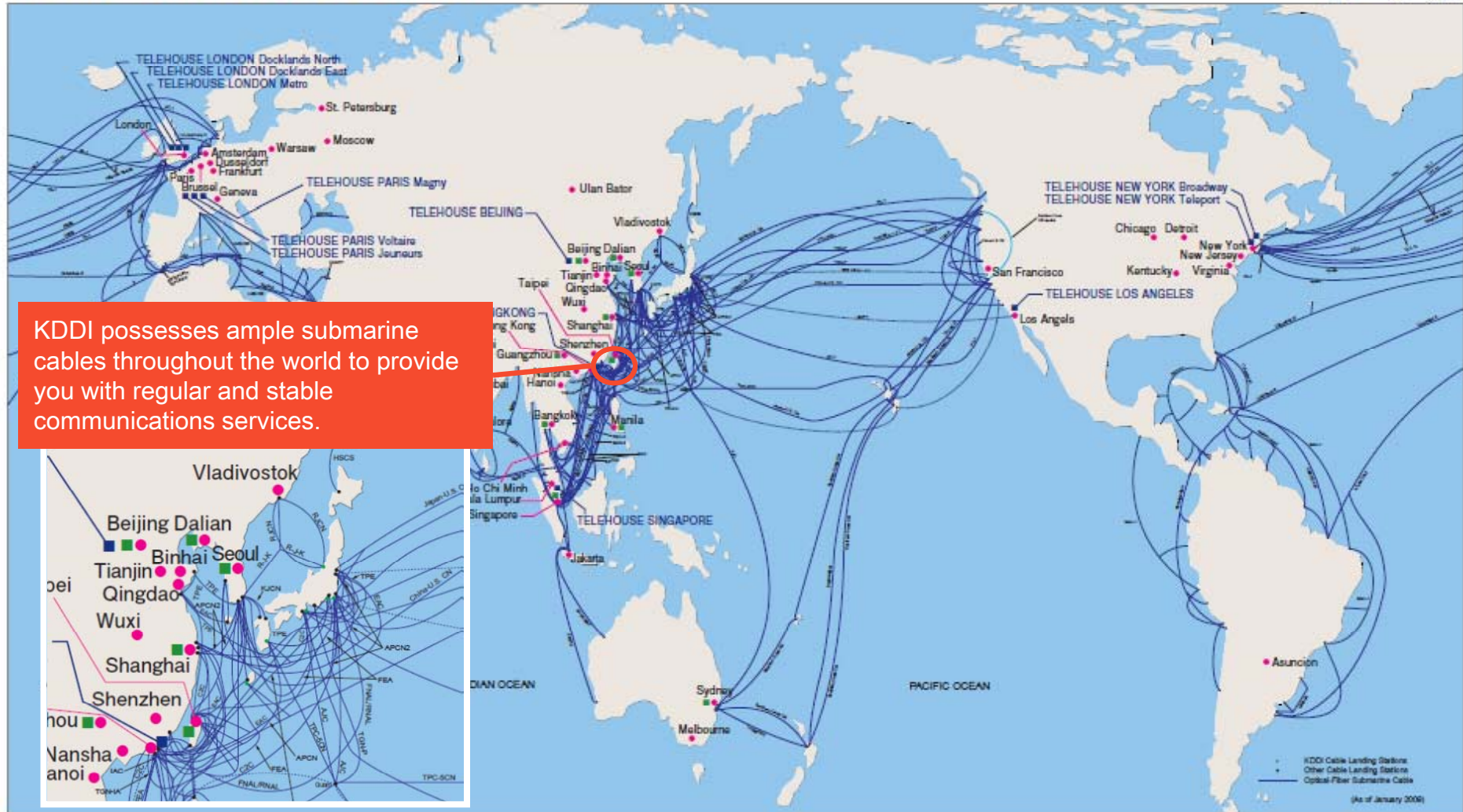
- KDDI utilizes its rich connections with local regulatory ministries, international carriers, and domestic carriers.
- KDDI secures the optimal contact point with the operations managers of other carriers, and construction managers.
- Realizes the early restoration by closely communicating even during a circuit fault.

### Outstanding Technical Staff and Operational Standards

- In addition to experienced Japanese staff, KDDI also hires outstanding local staff from Local Carriers and Vendors.
- KDDI thoroughly trains its personnel on process management, and performs quality management, and continuous improvement of operations standards.
- High performance and efficient maintenance is realized by configuring the equipment to the optimal condition through accurate and detailed use.



## KDDI Global Network Map



KDDI possesses ample submarine cables throughout the world to provide you with regular and stable communications services.

*Designing The Future*

