

D.e-Express Introduction of High-Speed Function

Ver.1.12

20XX/XX/XX

TOYOTA SYSTEMS CORPORATION

1. Problem of connection speed from overseas

The D.e-Express connection speed can be decreased by distance between locations, or conditions of network infrastructure.

- In other words, **the connection speed with 100Mbps does not work effectively.**

* Primary factors of reducing network performance

(1) Range Delay

Range delay reduces network performance.

Factor : Locations are far separated.

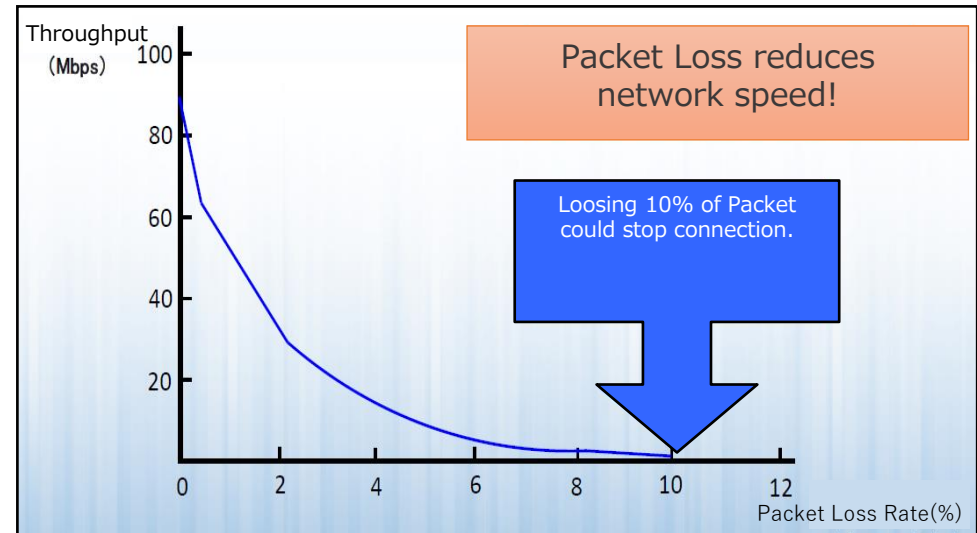
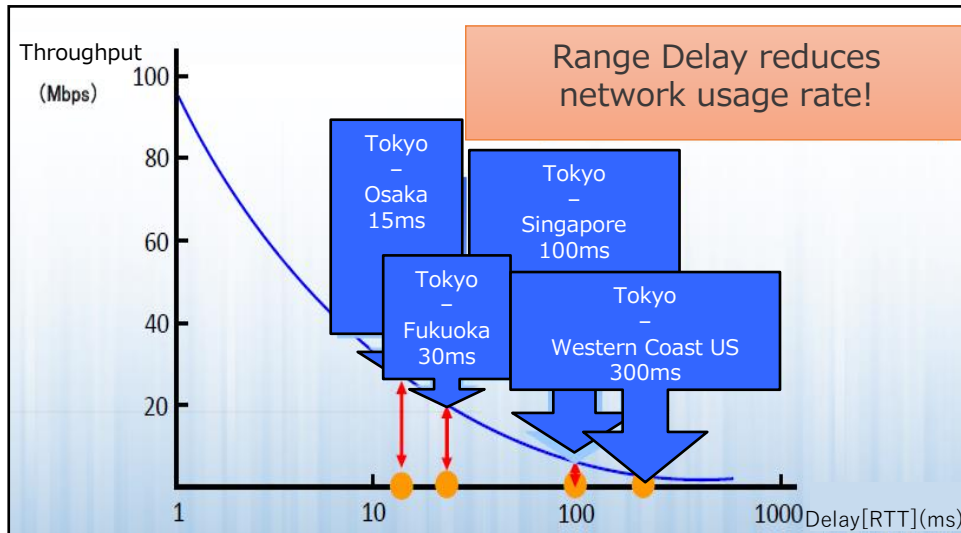
(Generally, it occurs between Europe and South America)

(2) Packet Loss

Loosing 10% of packet could stop connection.

Factor : Insufficient network quality.

(Generally, it occurs in Asia.)



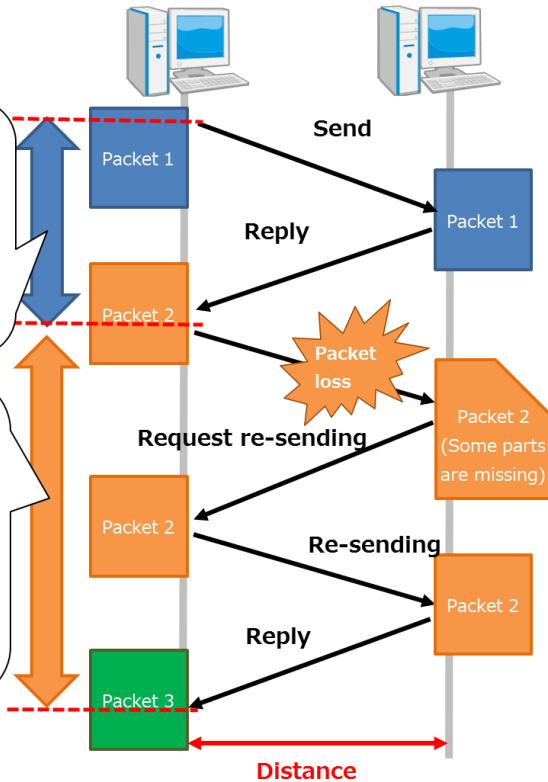
D.e-Express High-Speed option reduces the influence of range delay and packet loss that improves the network performance.

2.High-Speed option that uses multiplexing

High-Speed option takes multiplexing that reduces standby time on TCP connection and improves network connection speed.

[Regular TCP Connection]

Waiting Time Flow of Packet

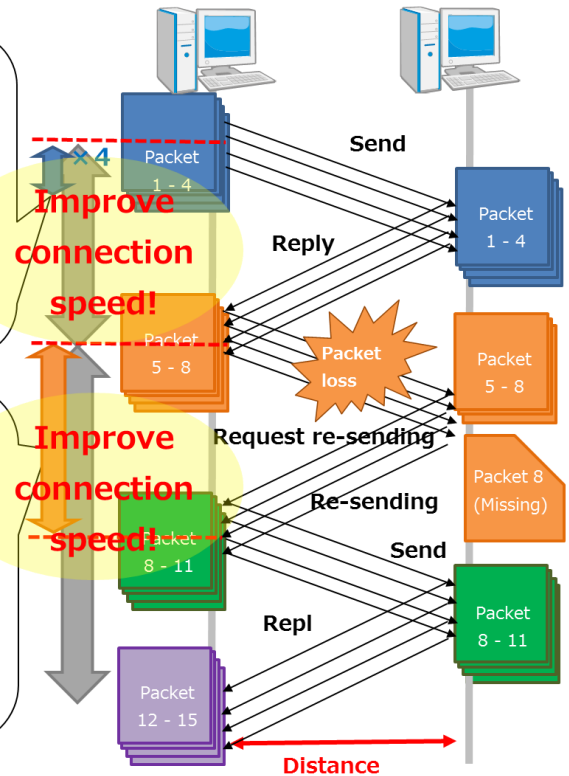


(1) Range Delay
Connection speed decrease on long distance.

(2) Packet Loss
Re-sending packet stops connection and decrease connection speed.

[Multiplexing TCP Connection]

Waiting Time Flow of Packet

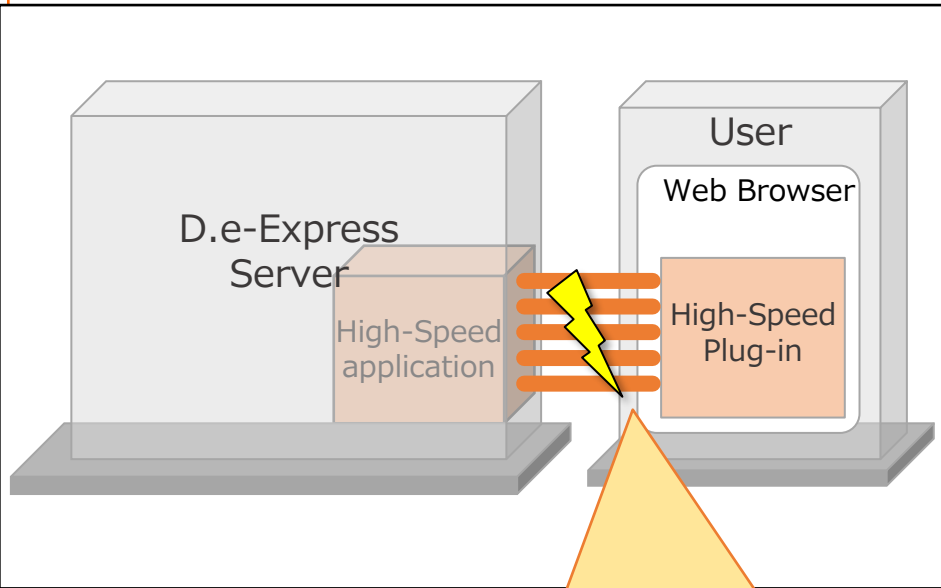


(1) Anti Range Delay
Increasing number of sending packet improves connection speed on long

(2) Anti Packet Loss
Re-sending packet does not stop connection and improves connection speed on packet loss.

3. Structure of High-Speed option

[Overview of High-Speed option]



High-Speed application provides multiplexing file transfer. User only need to applies High-Speed Plug-in on web browser. (Required no extra devices, network configurations)

[Estimates]

- Transfer time can be between 1/4 and 1/10 (Depends on condition).
- More effective on large range delay or large frequency band.

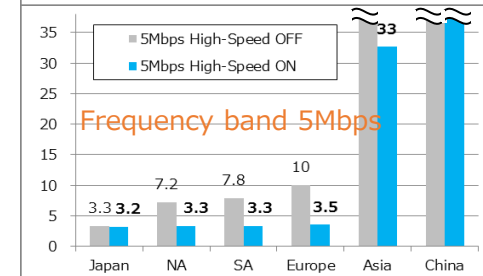
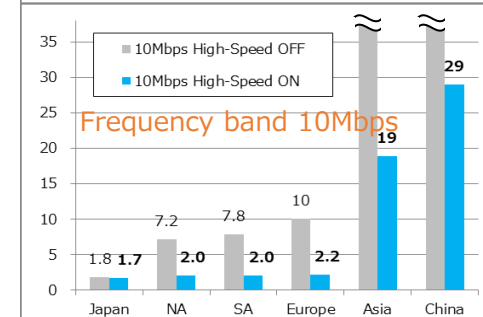
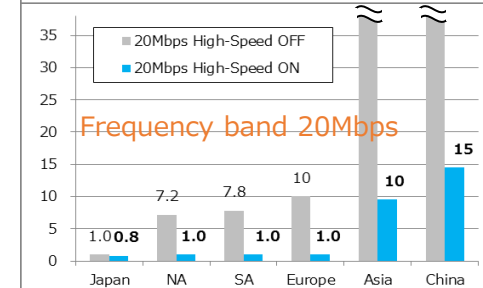
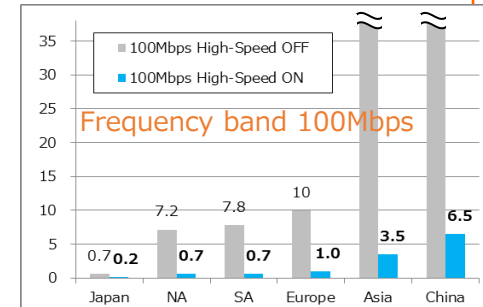
<Conditions of simulation>

- Comparing a file(100MB) transfer time between High-Speed option on and off.
- Estimating on frequency band with 100, 20, 10, 5Mbps.
- Estimating with following range delay and packet loss rate.

Area	Delay	Packet Loss Rate
Japan	20ms	0%
Europe	280ms	0%
NA	200ms	0%
SA	220ms	0%
Asia	120ms	5%
China	150ms	25%

Notice: Every result is a rough estimate and depends on network condition.

- NA represents North America
- SA represents South America



4. Compare with other High-Speed service

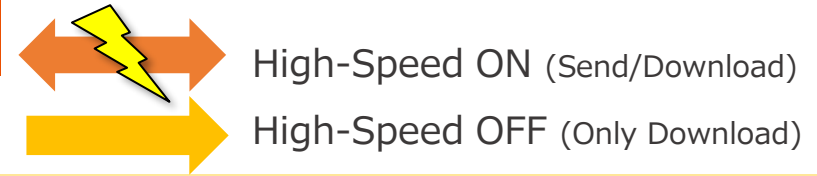
D.e-Express High-Speed option is suitable for Cloud Computing Service and Data Transfer Service!

High-Speed Technology	General High-Speed service (with TCP)	D.e-Express (with HTTPS)
Structure	<p>It's general use, but required extra device. (*1) - Suitable for using inner company.</p>	<p>No extra devices are required - Suitable for using between Unspecified Locations.</p>
Compression Cache	Compression: Weak (Depends on data) Cache: Weak (Only for static data)	Not Available
Reducing Delay	Good (Optimizing CIFS protocol) Weak (Proxy ACK by TCP)	Good (Multiplexing)(*2) Keeping connection while suspending
Optimizing Loss Packet	Not Available	Good (Multiplexing) Keeping connection while suspending

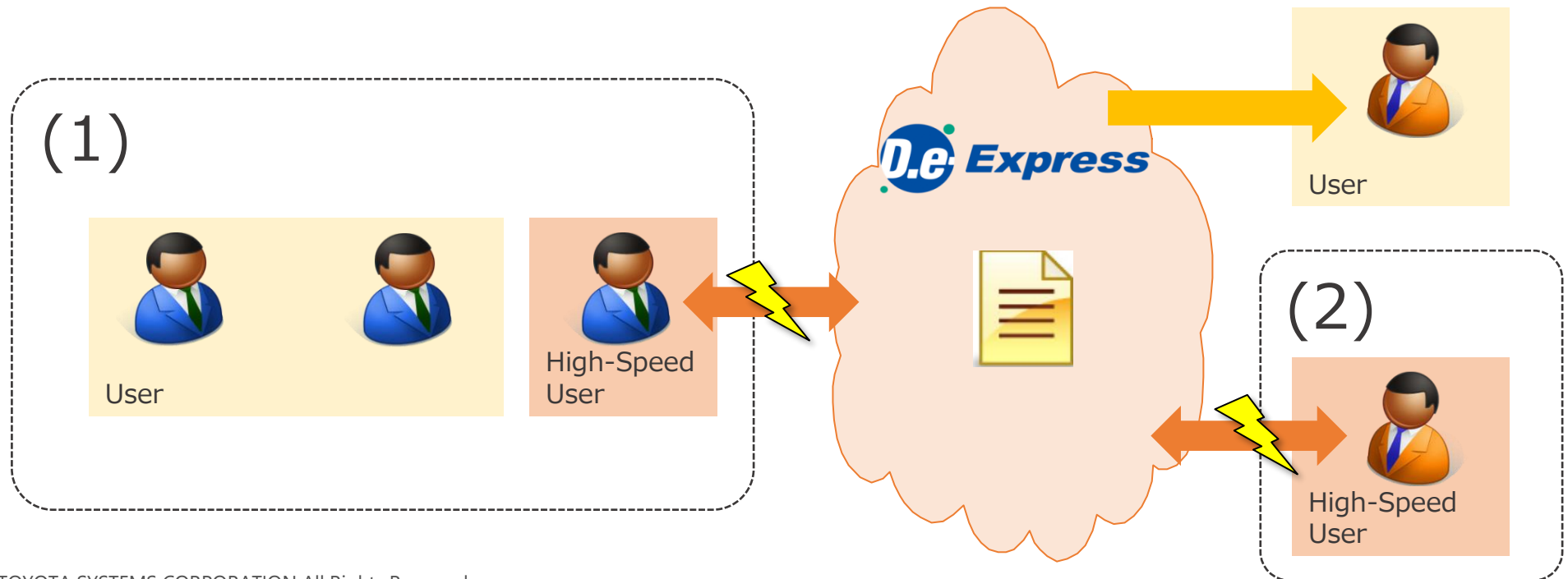
*1 : Some of services are using UDP instead of TCP, but generally it's still required to install special software or some configurations.

*2 : High-Speed communication is available by multiplexing that can transfer exceeding window-size.

5.An Image of Contract



- (1) High-Speed option is available for users who are in D.e-Express contract.
- (2) Destination users are required to make contract with D.e-Express service with the High-Speed option.

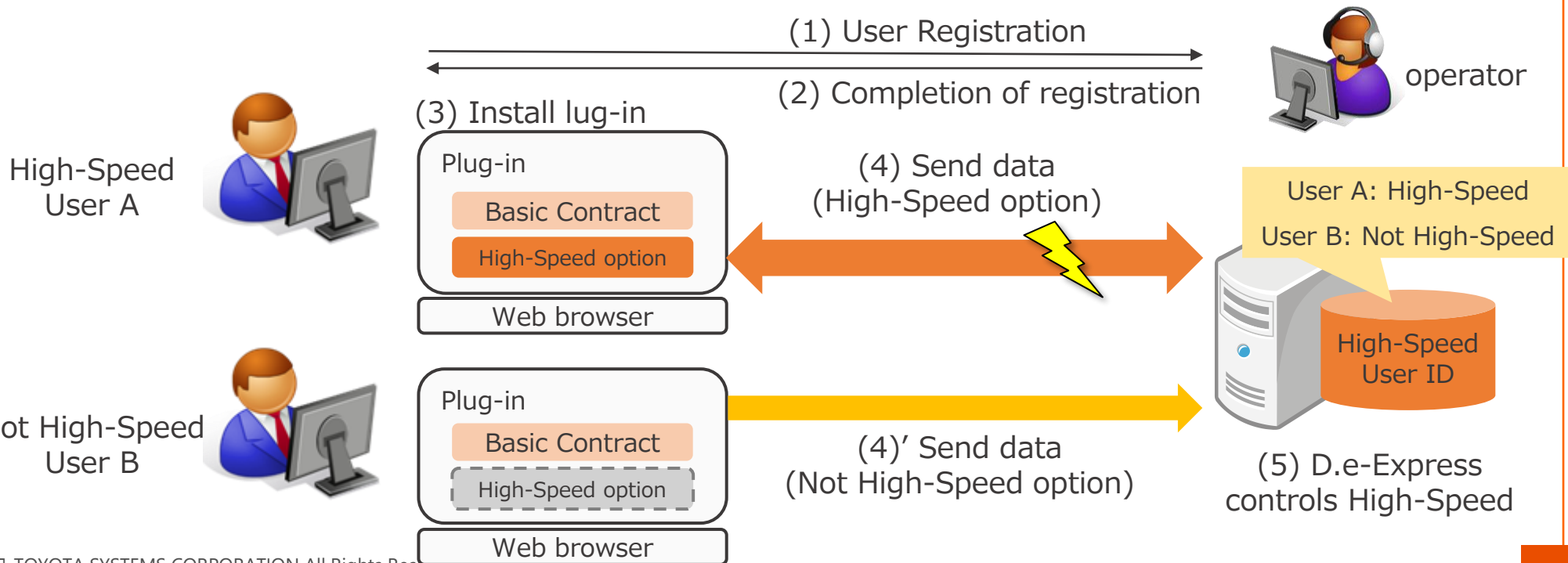


6. Service Charge

	Functions	Charge	
		Japan	Other country
File exchanging	Send or its approval	JPY4,000 a month (for 5 IDs) * JPY800 a month for an additional ID (JPY600 a month at more than 2,000ID) * Minimum term of contract: 12 months	Contact Sales
	Receive, reply, approval of reply	Free	
Administration	Log viewer, usage amount viewer	Free	
Options	High-Speed transfer	JPY400/ID a month (+ service fee above)	Contact Sales
	Additional data usage amount	JPY20,000/1 option a month (+ service fee above) *Required to use over 100GB/month. *Increases 100 GB for 1 month per 1 option.	
	IP address control	Contact Sales	
	Application interface (API)		
	Monitoring usage / alert		
Others			

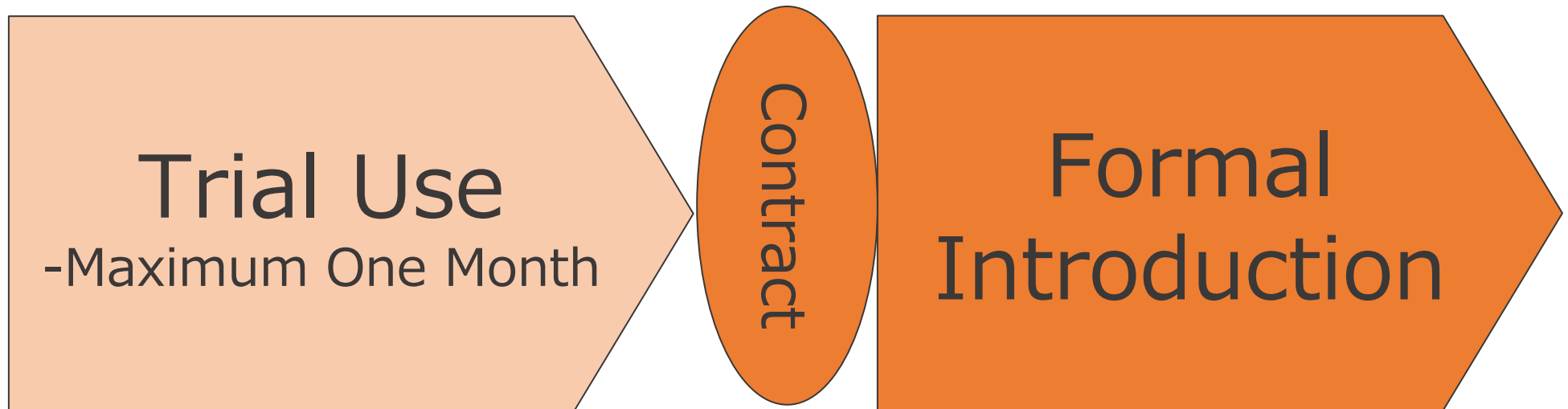
7.Introduction to High-Speed Option

- (1) Register users for High-Speed option
(The lead time is as same as the basic contract).
- (2) Completion of registration
- (3) Install the Plug-in (Simple Installation).
- (4) The user is only required login to D.e-Express for using High-Speed option(The usual operation on web browser).
- (5) D.e-Express controls users for High-Speed option.



8.Recommendation before using High-Speed option

We recommend trial use of High-Speed option, because the network performance is depends on various conditions and we cannot guarantee improving network performance on every situation.



9.Specification

- Requirements

The environment ^(*1) ^(*2) where the this function were confirmed is as follows.

OS	Browser
Windows 10 (Only 64-Bit Edition)	Google Chrome (64-Bit Edition)
Windows 11	Microsoft Edge (64-Bit Edition) * Only the Chromium-based Microsoft Edge is usable.

Note: The environment above is subject to change in relation to the version upgrade of the Service, the support conditions of the OS / browser manufactures, etc.

(*1) : In some case, the Service cannot be used in your environment.

(*2) : In order to use all the functions of the Service, it is necessary to use the D.e-Express plug-in installed.

Q1: What is difference between High-Speed and Increasing Bandwidth?

A: Increasing Bandwidth is not effective on range delay, packet loss such as communicating with far location or low quality of network infrastructure.

High-Speed option raises communication speed within the bandwidth.
This means if the communication line has no space available within the bandwidth, High-Speed option is not effective.

We recommend trial use of High-Speed option,
because of High-Speed option is depends on network condition.

Q2: Does High-Speed option affect on other network service?

A: Yes, High-Speed option may reduce the performance of other network service,
but High-Speed option controls QoS(Quality of Service) and protects other important services.

Q3: Is every file transfer speed improved with High-Speed option?

A: High-Speed option improves only for users who have High-Speed option.
Basic contract and High-Speed option are required for users who need to use High-Speed file transfer.

Q4: Does High-Speed option has any limit such as number of IDs, contract period?

A: High-Speed option does not have any limit on number of users and contract period,
but user is required to make a Basic contract with D.e-Express.
(Notice: Basic contract requires least 5 IDs and minimum contract period is 12 months)

Q5: Are there any situations that reduces the performance of High-Speed file transfer?

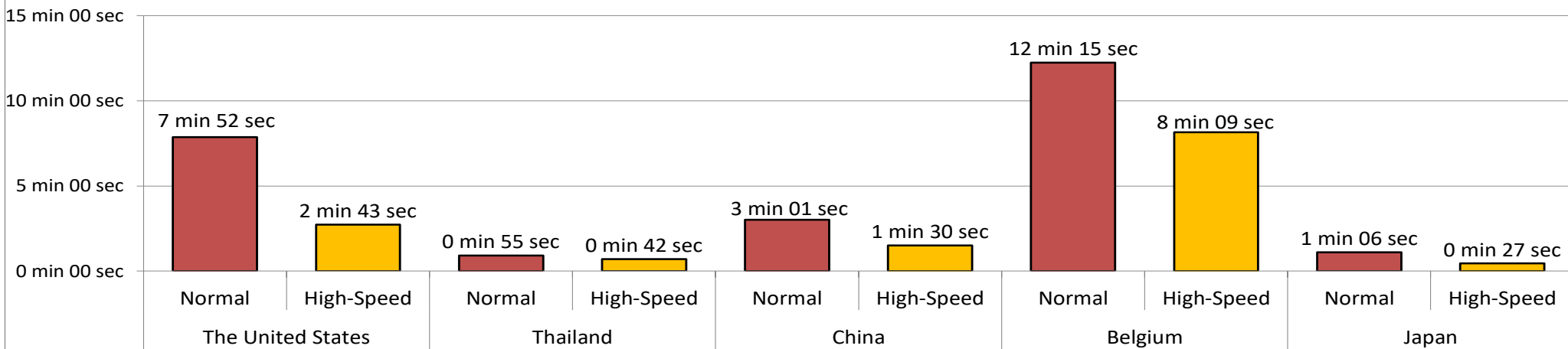
A: We expect following situations that reduces the performance of High-Speed file transfer.
We recommend customers using trial service of High-Speed file transfer before applying.

- 1) There's no sufficient network bandwidth.
- 2) Networking devices (proxy server, firewall etc.) are limiting TCP connections for each client computer.
- 3) Internet Service Provider is limiting the amount of data transfer.
* This is including the network in a hotel, public wireless, mobile network etc.

Appendix1.Effectiveness of High-Speed option

- Upload

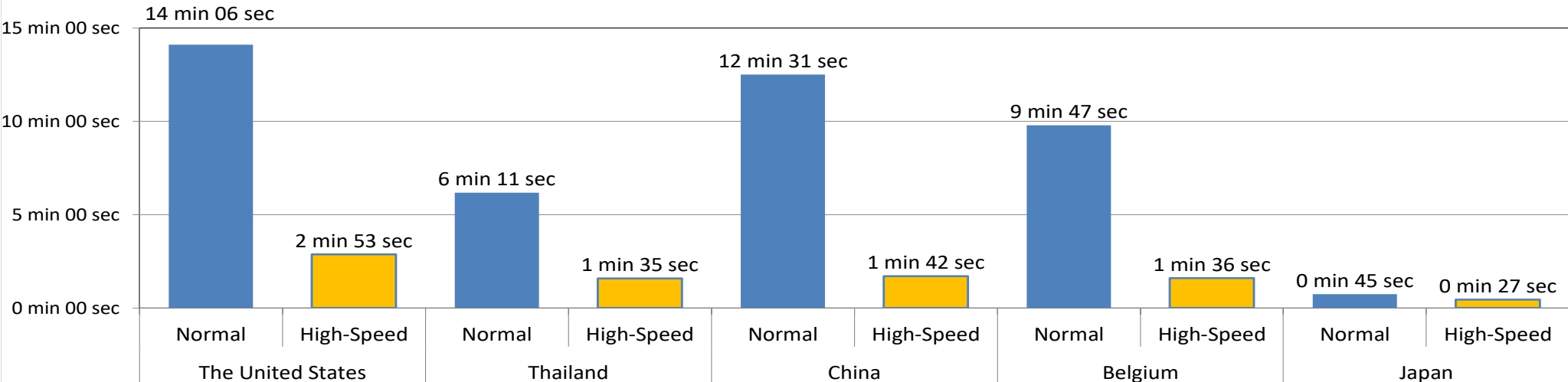
Conditions	The United States. Bandwidth : 30Mbps Delay : 209ms Packet Loss rate : 0%		Thailand Bandwidth : 20Mbps Delay : 105ms Packet Loss rate : 0%		China Bandwidth : 10Mbps Delay : 54ms Packet Loss rate : 5%		Belgium Bandwidth : 10Mbps Delay : 280ms Packet Loss rate : 0%		Japan Bandwidth : 300Mbps Delay : 10ms Packet Loss rate : 0%	
	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]
Normal	7 min 52 sec	1.7	0 min 55 sec	14.5	3 min 1 sec	4.4	12 min 15 sec	1.1	1 min 6 sec	12.1
High-Speed	2 min 43 sec	4.9	0 min 42 sec	19.0	1 min 30 sec	8.9	8 min 9 sec	1.6	0 min 27 sec	29.6
Effect	<i>Reduce 5 min 9 sec</i>	<i>2.9 Times</i>	<i>Reduce 13 sec</i>	<i>1.3 Times</i>	<i>Reduce 1 min 31 sec</i>	<i>2.0 Times</i>	<i>Reduce 4 min 6 sec</i>	<i>1.5 Times</i>	<i>Reduce 39 sec</i>	<i>2.4 Times</i>



Appendix1.Effectiveness of High-Speed option

- Download

Conditions	The United States. Bandwidth : 30Mbps Delay : 209ms Packet Loss rate : 0%		Thailand Bandwidth : 20Mbps Delay : 105ms Packet Loss rate : 0%		China Bandwidth : 10Mbps Delay : 54ms Packet Loss rate : 5%		Belgium Bandwidth : 10Mbps Delay : 280ms Packet Loss rate : 0%		Japan Bandwidth : 300Mbps Delay : 10ms Packet Loss rate : 0%	
	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]	100MB file Transfer period	Throughput [Mbps]
Normal	14 min 6 sec	0.9	6 min 11 sec	2.2	12 min 31 sec	1.1	9 min 47 sec	1.4	0 min 45 sec	17.8
High-Speed	2 min 53 sec	4.6	1 min 35 sec	8.4	1 min 42 sec	7.8	1 min 36 sec	8.3	0 min 27 sec	29.6
Effect	<i>Reduce</i> 11 min 13 sec	4.9 Times	<i>Reduce</i> 4 min 36 sec	3.9 Times	<i>Reduce</i> 10 min 49 sec	7.4 Times	<i>Reduce</i> 8 min 11 sec	6.1 Times	<i>Reduce</i> 18 sec	1.7 Times



END