network preparation and operation at Tokyo 2020 Games

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The Tokyo Organization Committee of the Olympics and Paralympic Games
(abbreviated as "**Tokyo 2020 Organization Committee**" or "**Tokyo 2020**" in this presentation)

Self Introduction

Wataru SAITO

Senior Director of ICT Solutions
Technology services, Tokyo2020
(a TOC Director, Tech Operation Center at Games time)

Mar, 1993	graduated from School of Engineering, University of Tokyo with Master of Engineering
Apr, 1993	joined Nippon Telegraph and Telephone, Corp. (“NTT”)
then, worked for	・global telecom service launch project at NTT America from 1996 ・MBA, class of 2001 at Carnegie Mellon University ・HR management and corporate planning at NTT Com from 2001 ・customer system operations and cloud services at NTT Com from 2007 ・business development for 2020 at NTT from 2014
Jul, 2018 -	responsible for Telecommunications and Frequency/Radio as the above position at Tokyo2020

Agenda

1. Small Introduction

2. Network Overview for Tokyo 2020

3. Features and Impact Factors of Tokyo 2020 network … (1)(2)(3)(4)

4. Various types of Sport competitions and Many Venues/Facilities＝ (1)

5. Long preparing period + 1 Year = (2)

6. Usage Image and Scales/Statistics

7. end-customers come and systems go live…, right before the Games start ＝ (3)

8. Lots of Technology Partners ＝(4)

Some info/data and abbreviations in this presentation can be slightly different from the actual ones because of those based on my memory.

Outline of Tokyo 2020 Games

	TOKYO 2020	TOKYO 2020 PARALYMPIC GAMES
names	Games of the XXXII Olympiad	Tokyo 2020 Paralympic Games
Terms	Jul 24th(Fri) to Aug 9th(Sun), 2020 ↓ Jul 23th(Fri) to Aug 8th(Sun), 2021	Aug 25th(Tue) to Sep 6th(Sun), 2020 ↓ Aug 24th(Tue) to Sep5th(Sun), 2021
Sports	33 sports (50 disciplines)	22 sports (23 disciplines)
Events	339	537
Athletes	about 11, 000	about 4,400
Teams & Nations	205	164

Remark) These figures are not official, which I found in open info

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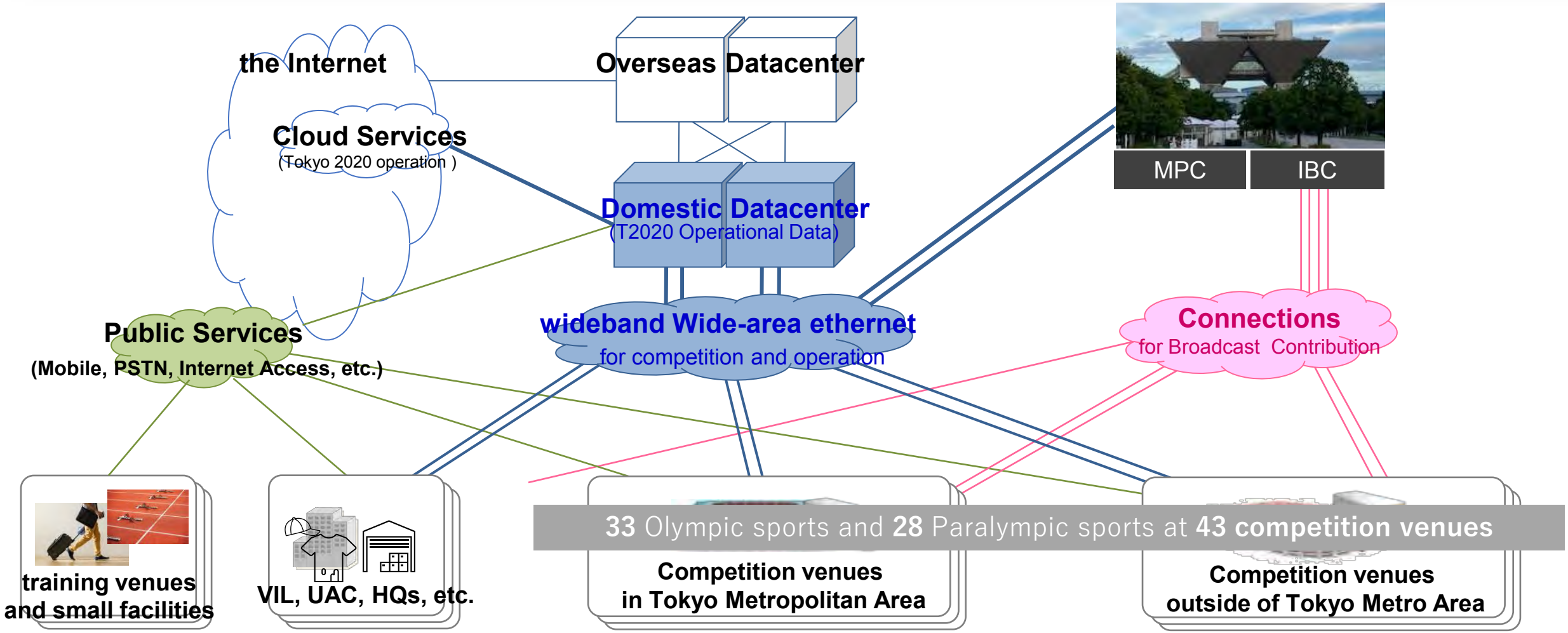
Telecom Network/Services Overview

✓ T2020-Telecom team provided **Data-network** infra with datacenters to TEC and other FAs, **Broadcast Contribution Network** for OBS, and **telecom services** to stakeholders such as the Internet access and CATV.



Telecom Network/Services Overview

✓ **Broadcast Contribution Network** is to convey material videos for broadcasting from each competition venue to IBC*, which is one of the most important network because of expected more than 5 billion TV watchers.

* International Broadcast Center

- 4K-based video materials conveyed **from OBS compound to IBC** through the network
- **Redundant** lines of **completely different underground-routes** between each venue and IBC
- Transmission equipment and in-venue network were provided by OBS

MPC | IBC

Connections
for Broadcast Contribution

Public Services
(Mobile, PSTN, Internet Access)

training venues and small facilities

VIL, UAC, HQs, etc.

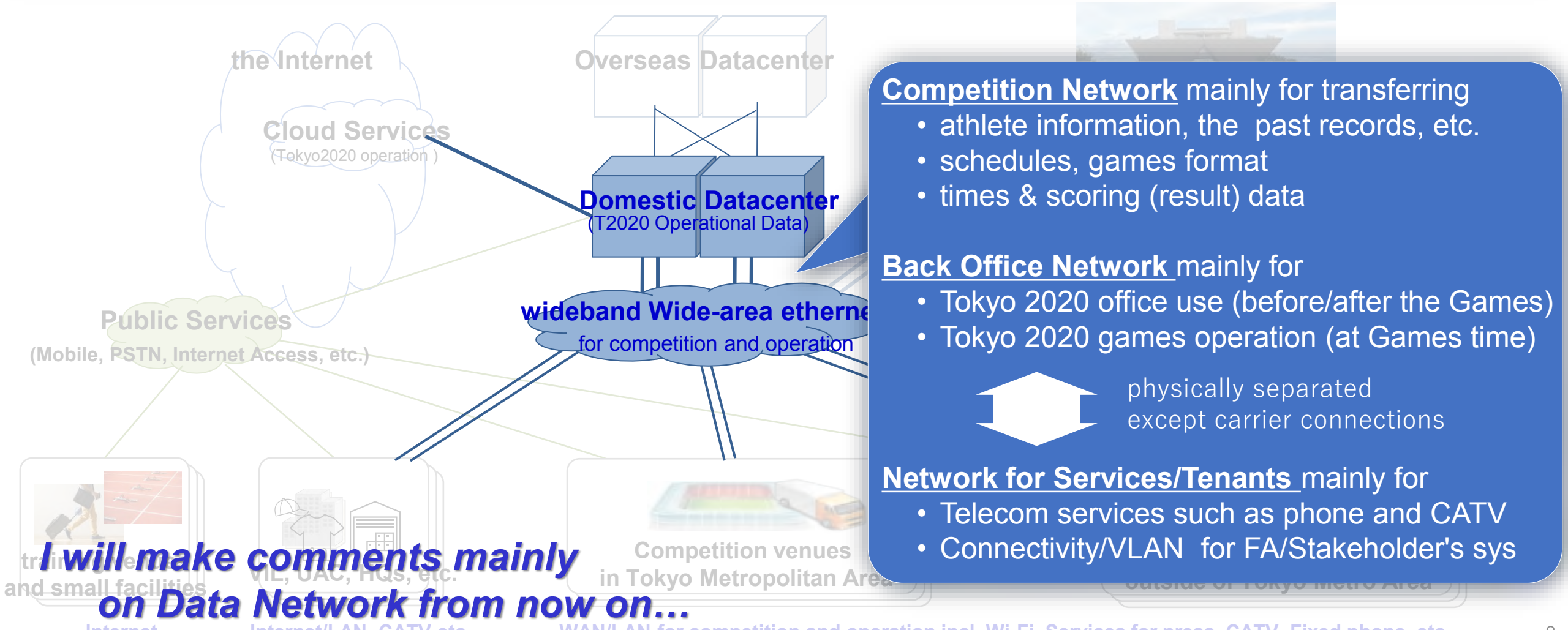
Competition venues in Tokyo Metropolitan Area

Competition venues outside of Tokyo Metro Area

Internet | Internet/LAN, CATV etc. | WAN/LAN for competition and operation incl. Wi-Fi, Services for press, CATV, Fixed phone, etc.

Telecom Network/Services Overview

✓ Data-network consists of **Competition network** (**CPN**), **Back Office network** (**BON**) and **Network for stakeholder services / tenant users** (**OTN**), which are virtually and/or physically separated from each other.



Competition Network mainly for transferring
- athlete information, the past records, etc.
- schedules, games format
- times & scoring (result) data

Back Office Network mainly for
- Tokyo 2020 office use (before/after the Games)
- Tokyo 2020 games operation (at Games time)

physically separated
except carrier connections

Network for Services/Tenants mainly for
- Telecom services such as phone and CATV
- Connectivity/VLAN for FA/Stakeholder's sys

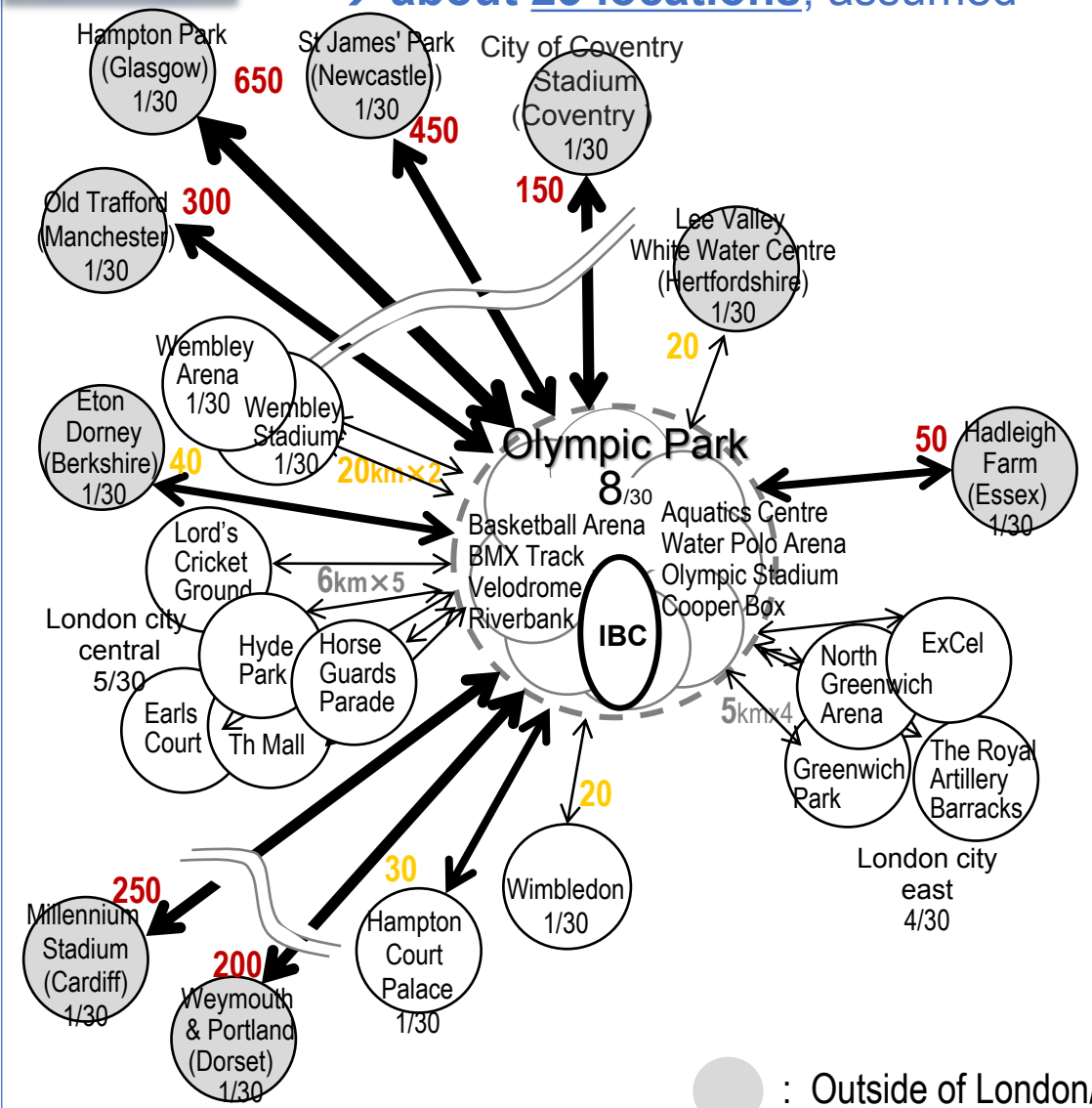
I will make comments mainly on Data Network from now on…

Largest number of venues/locations ever

unit : km

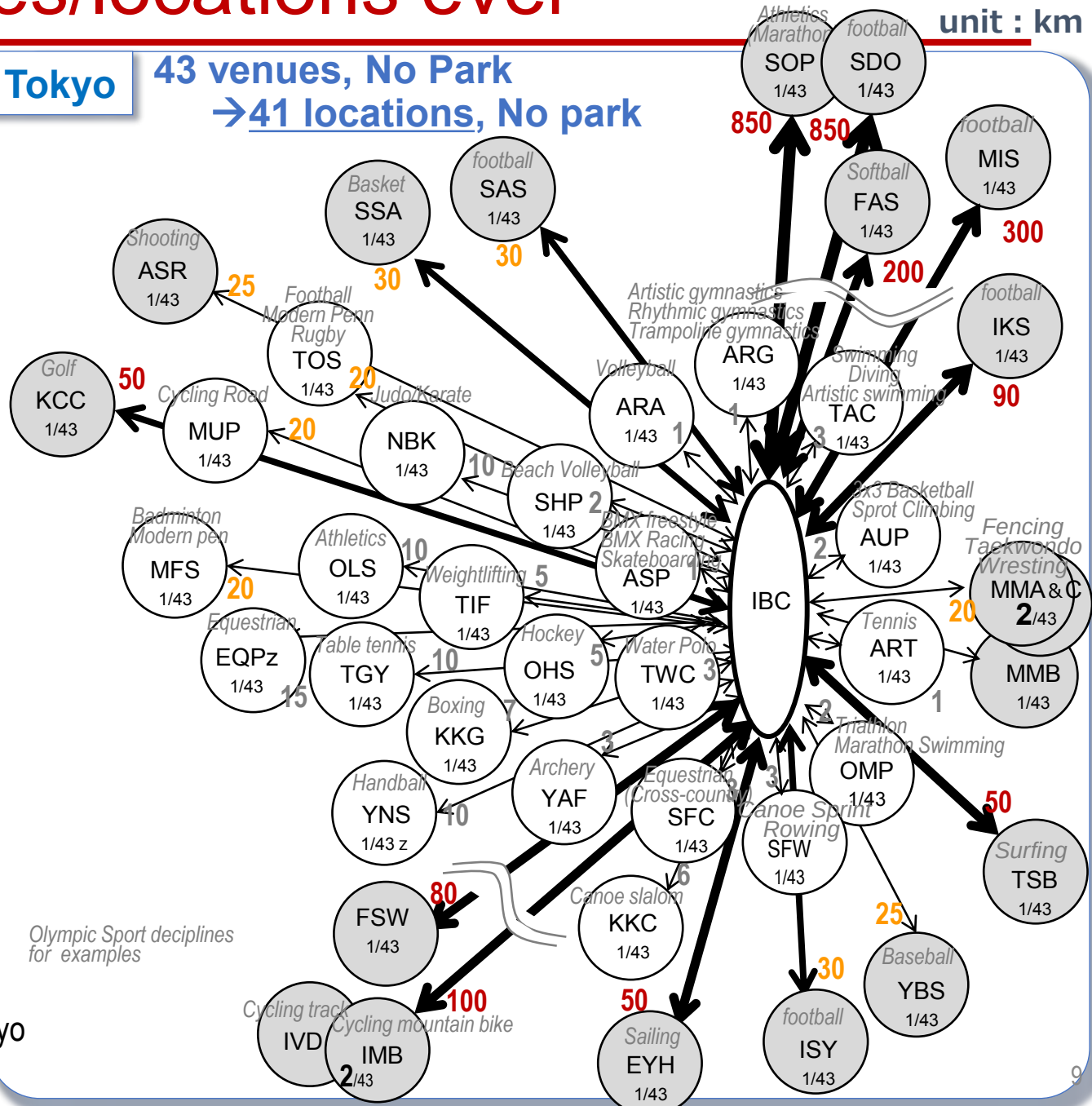
London

30 venues
→ about 23 locations, assumed



Tokyo

43 venues, No Park
→41 locations, No park



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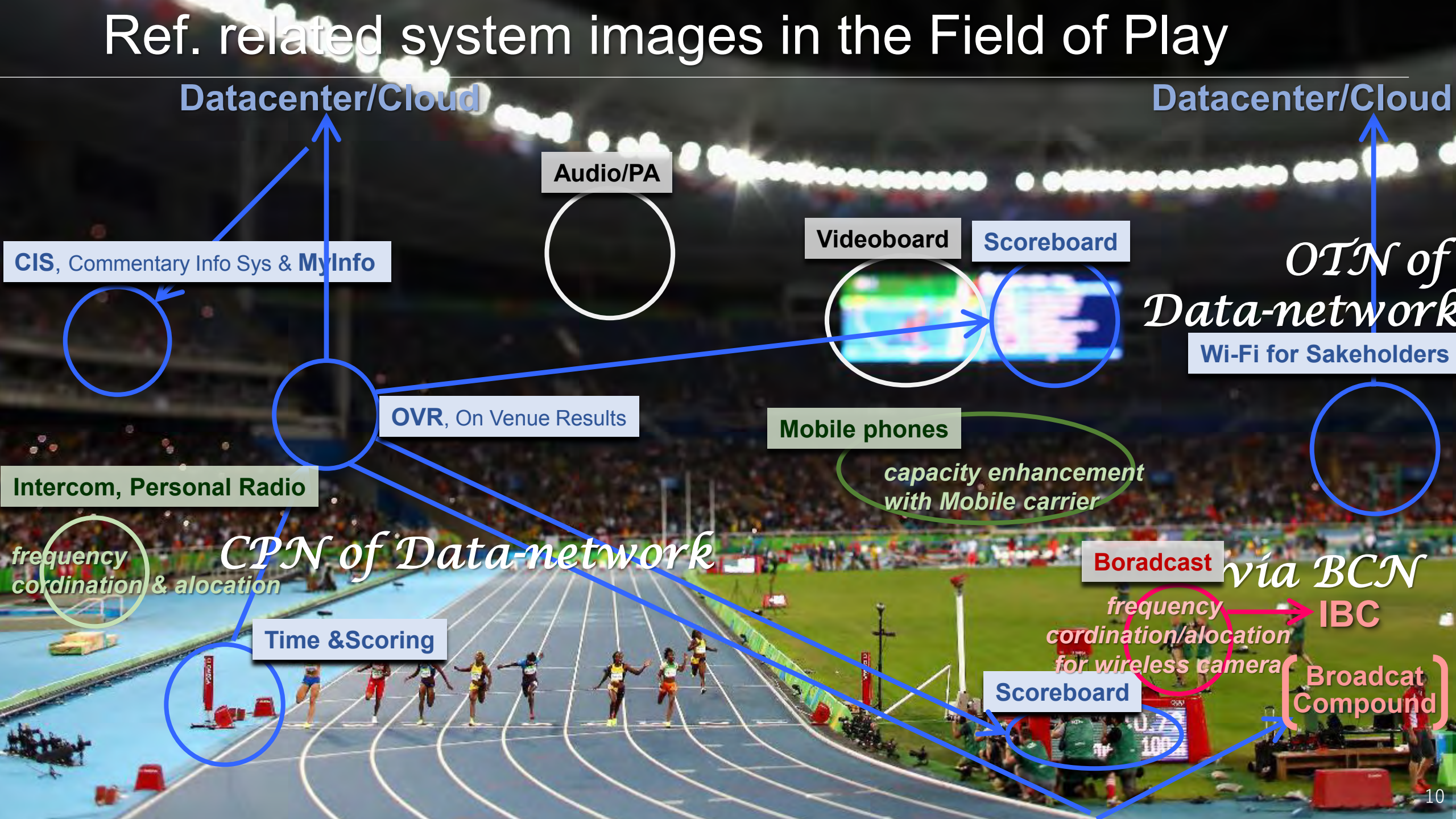
Ref. related system images in the Field of Play



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Features that impacts on Network Infra/Telecom services

I've never experienced sports events other than Tokyo 2020, but it seems that there are some features …

(1) requirements as common platform for **various types of sport competitions and venues/facilities**

- **33** Olympic disciplines and **28** Paralympic disciplines at **43 comp venues (41 locations).**
- **More than 50 Factional Areas** such as TEC, NRG, SEC, ACR, MED, TRA and SPT
- Projects led by **IOC** and **partners** - workforce video for knowledge transfer, demonstration of local 5G, etc.

* **but "No spectators"** had **almost no impact** on network infra/services, except **marketing area, hospitality services, customer gates (PSA)**, etc.

(2) **long preparing period**

- Tokyo 2020 in **January 2014** (Bureau of Technology services started from **July 2014 → 6 years +1**)
- basically **4 years' interval for Summer Competition**
- **starting from almost zero-basis for Tokyo 2020** services and new projects

(3) customers come and **systems go live right before the Games start**

- athlete, delegations, press, broadcaster, Olympic/Paralympic family, IF/NF, etc.
- several systems for Games operations such as logistics, transport, medical, and energy management.

(4) lots of **technology partners** (who have prioritized supply rights)

- Official Timekeeping & result, Information Technology, AV, Telecom, Network Equipment, Servers, etc.

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Facilities/Offices/Sites other than Competition Venues

✓ **43 competition venues (41 locations)** – previously shown

→ **Data network WAN circuits/LAN** were provided

✓ **Other operation sites and facilities**

- **MPC** : Main Press Center
- **IBC** : International Broadcast Center – main at Tokyo Big sight and backup in OLS
- **VIL** : Olympic and Paralympic Villages - main, sailing, and cycling villages
- **UAC** : User Accreditation/Uniform Center - main center in Tokyo
- **MDC**s : Main Distribution Center - two centers near Tokyo, because of space limitation
- **OFH/PFH** : Olympic/Paralympic Family Hotel
- **Marketing/Partner/Hospitality Area** – usually located in Park
- **HQ offices –** FCC such as Main Operation Center, and Tech OC located in Harumi office

→ **Data network WAN circuits/LAN** were provided

- small district **UAC**s, **Fleet/Bus Depots, satellite villages,** some **Training Venues,** small district **Offices/Centers** at **Sapporo, Narita, Haneda**, etc.

→ **Fixed Internet Access* with small LAN** were provided

more than **80** locations in total

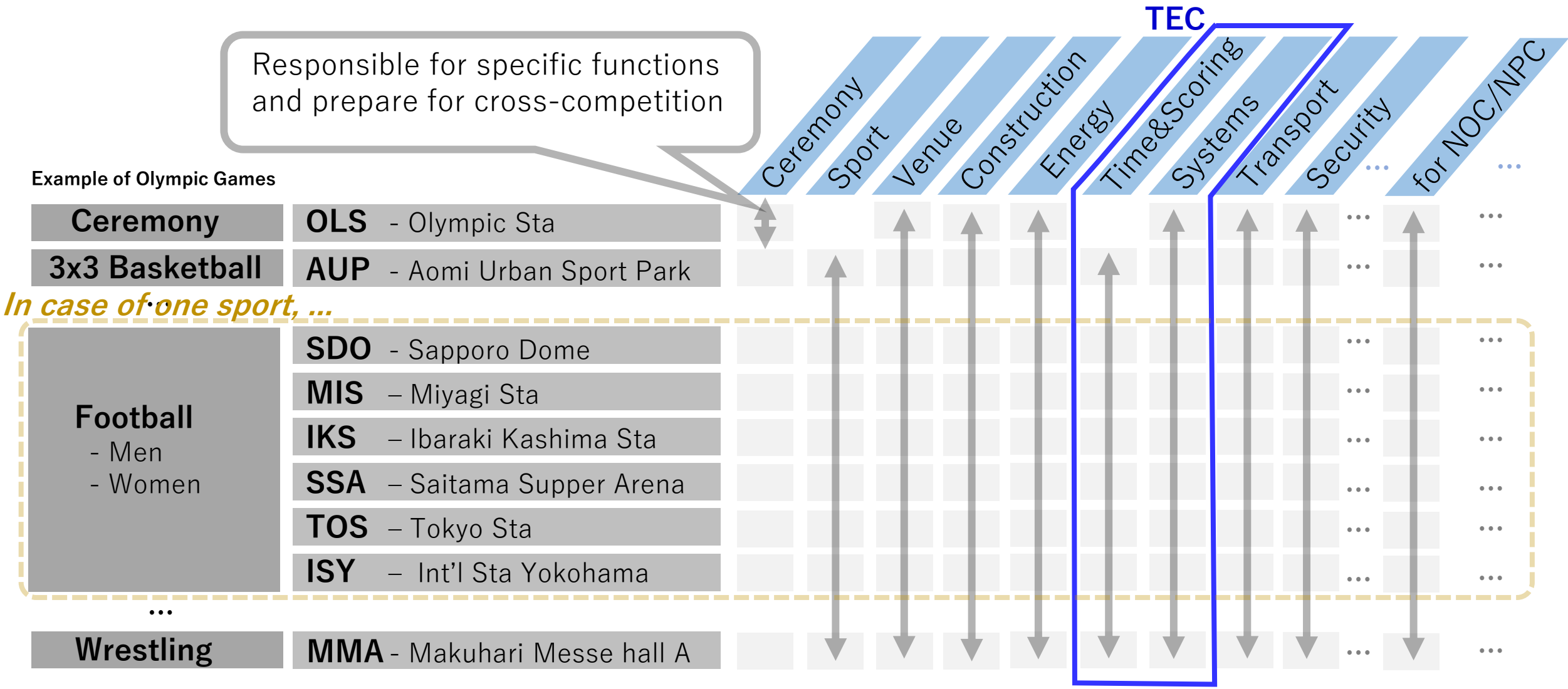
- **Temporary offices**, **peripheral area** in Competition venues, backup for **office w/no redundant circuits**

→ **Mobile router for internet access***

*users were possible to access to Data-network via **remote access service** provided by Tokyo 2020

What is Functional Area, and for what

In order to more efficiently coordinate operation of multiple competitions, clarify and define the duties in charge for each field and proceed with management preparations for each. Each field is called functional area (“FA”).



Ref. Sample of FAs and Tokyo 2020 bureaus and offices

Planning & Finance
CUL culture
EDU education
LGT legacy
FIN finance
PRC procurement

Int'l Relationship
NCS NOC/NPC services
OFS/PFS Olympic/Paralympic family service
LAN language
IKL information & knowledge management

Spots
SPT sports
INS IF services

Marketing
BIL brand, Identities & look
BRP brand protection
BUS business development
TKT ticketing
LIC licensing
MPS marketing partner services

Games Operations
PNC planning & coordination
BRS broadcast services
ACR accreditation
VEM Venue management
CCC communication, coordination, and command/control
CTY city operation
GOV government coordination
FNB food & beverage
VIL athlete village management
OPR operations?
EVS event services
TEM test event management
SIG signatures
MED medical services
CNW clean & waste
DOP anti-doping control

Venues
VNI venue integration
NRG energy management

Transport
TRA transport
AND arrival and departure
LOG logistics
ACM accommodation

Administration
LGL legal affairs
RSK risk management
PEM personnel management
SUS sustainability

Communications & engagement
PRS press operation
COM communications
SPX sport experience
LIV city activities & live site

Technology Services
TEC technology r services

Security
SEC

PGI Paralympic games Integration - office

CER ceremony -office

OTR Olympic/Paralympic torch relay - office

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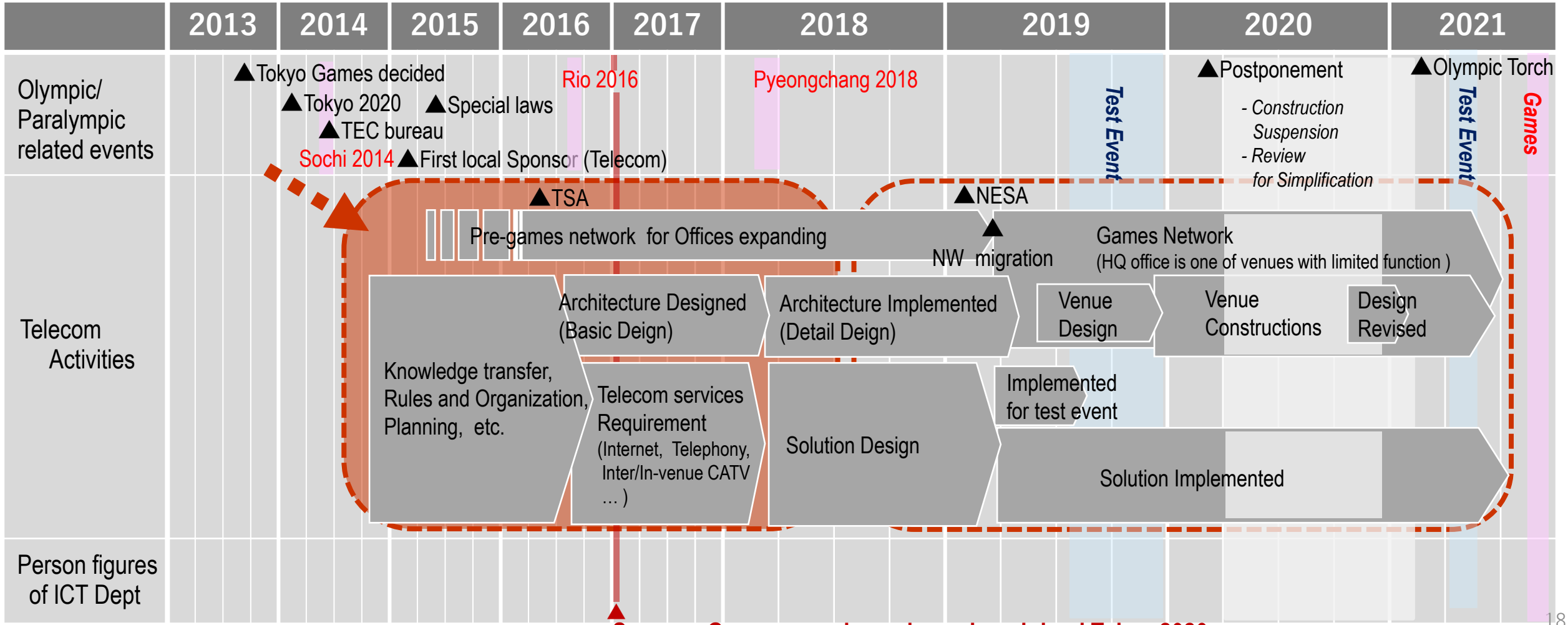
long preparing period ～ First three to four years

- ✓ Tokyo 2020 established 7 years ago→ need several years for Special measurement laws, budgeting, etc
- ✓ ICT started network for Tokyo 2020 staff called pre-Games network
- ✓ Meanwhile, learned Host city contract, Games guide, etc. as basic conditions and try to build good relationships with IOC-TEC, OBS, stakeholders, FAs, etc.

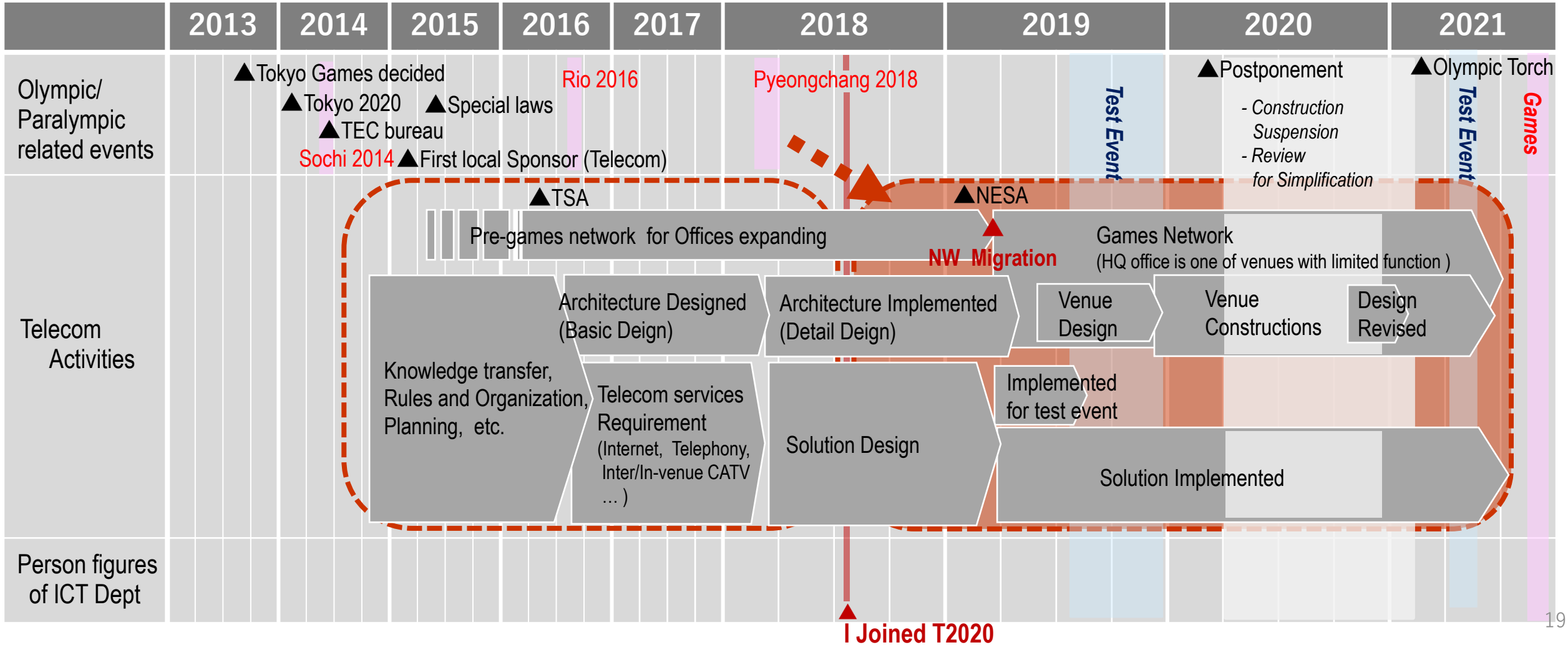


long preparing period ～ the last three years*

＊two years, if no “Covid-19” postponement … mention what we did in the year later (next pages)

・migrate Pre-games network to Games network based on gathered requirement and information.

- enough capacity, whitelisted, segmented
- originally Remote access VPN introduced for Venuization →it helped Covid-19 e-work of the staff.



Ref. during one-year postponement period …

Mar 24	- Japanese Prime Minister announced postponement after the meeting with IOC President
Mar 25	- asked partners/contractors to prepare for suspending constructions at Venues
Apr	- confirmed the suspension of construction and postponed new service launches
	- monitoring venue status to avoid removal of venue-installed equipment and facilities
	- decided basic policy within TEC
	- started negotiating service level/cost with ICT partners/contactors
Jun	- no change of Comp Venues decided, but UAC and a part of HQ offices would be moved
Jul to Aug	- downgraded service levels one by one
to Nov	- confirmed reduction of service numbers based on reviewed venue designs
Dec	- started physical network design review at each venue

…latter of the year Covid-19 related changes or activities

Jan to Mar 2021	covid-19 related changes
Apr	- started all the venue-network constrictions at full-scale
May	- TEV started

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right before the Game start, systems/facilities go live, stakeholder do tests, end-users come, …

- ✓ Since systems related to **competition results** (**time and scoring**) were tested in advance at laboratory and the test events, there were few severe problems related to data-network, although problems with system capacity and physical settings were found sometimes. (**CPN**)

- ✓ Since **systems/network for Tokyo 2020 staff** has been used for multiple years, few troubles occurred at Games time in terms of network. (**BON**)

- ✓ Troubles happened on **networks for FA systems** newly introduced mainly in **OTN**, what we called “FA network”, and on network related-to **venue environment** or **brought-in overseas equipment**.

  for example …

right before the Game start, systems/facilities go live, stakeholder do tests, end-users come, …

FA Network management in General (FA System go lives right before the Games)

- FA network in OTN usually had only a function of providing network connections to FA systems. That is, each FA would have responsibility for operations including security management. But…

Overlay Energy Facilities (Newly Constructed Facilities at Venues)

- Overlay-powers were down sometimes at venues mainly in May and June, at telecom installation stage, due to short circuits...

CATV services installation at all the Venues (Overseas Equipment etc.)

- The video feeds for CATV were planned to be got from OBS for our CATV services. The feeds were managed by TEC-Audio & Visual team.

FA System Requirement at Venues (New system)

- Some tablets for bus navigation system would be connected to the net via the Wi-Fi equipped in busses. But the system was not designed to use only at Buses, but …

right before the Game start, systems/facilities go live, stakeholder do tests, end-users come, …

Noise of Audio System (overseas equipment used in Japan first time)

- Audio system set up at ceiling seemed interfered with some radio waves, when it was tested at rehearsal held a couple of days before using them…

Stakeholder Wi-Fi for heavy users (Initial use at Venue)

- It was expected that lots of people would use the Internet by multi-devices at Media Centers at MPC and Press tribunes at venues. So, we deployed not only fixed ports at each desk but also many APs in each area.
  But there were constraints such as no (or too high) ceilings and no desktop space for APs...

Capacity Operation

- Internet access from/to Datacener had flexibility to change bandwidth by using high speed interface,
  so, we could easily upgrade/downgrade by changing the settings. But…

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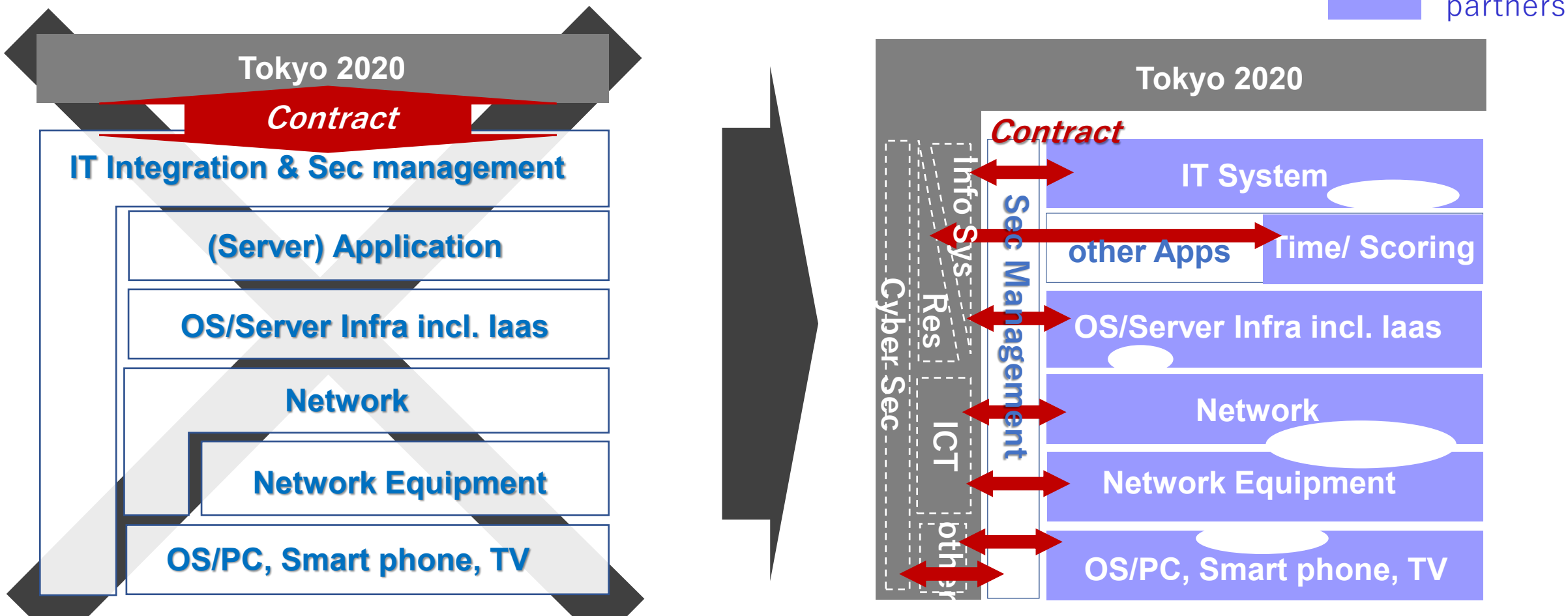
Sponsorship's impact on tech service management

- ✓ in usual business, it is possible to show requirements and to outsource the work to one company, who takes responsibility for the project and service.
- ✓ many tech-related sponsors have priority supply rights in each category, some of them already provides several services or functions. → T2020 needed to coordinate or manage all the related suppliers/partners to use each services.



Q&A

to

fin