Service | Innovation | Value

TELECOMMUNICATIONS TRANSFORMATION PROGRAM
Data Centre Networks (DCN)
Industry Day

Data Centre Networks Overview

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February 27, 2014

Shared Services Canada

Services partagés Canada

Canadä

Data Centre Networks Industry Day Overview
Objectives

- Provide an overview of the Telecommunications Transformation Program and Data Centre Networks, focusing on the key components of Data Centre Network services
    - Stream 1 – Inter-Data Centre Networks
    - Stream 2 – Intra-Data Centre Networks

- Highlight considerations for future service provision of these services
    - Deployment model considerations
    - High Availability options
    - Emerging technologies
    - Contract period
    - Pricing model options

- Solicit feedback from industry

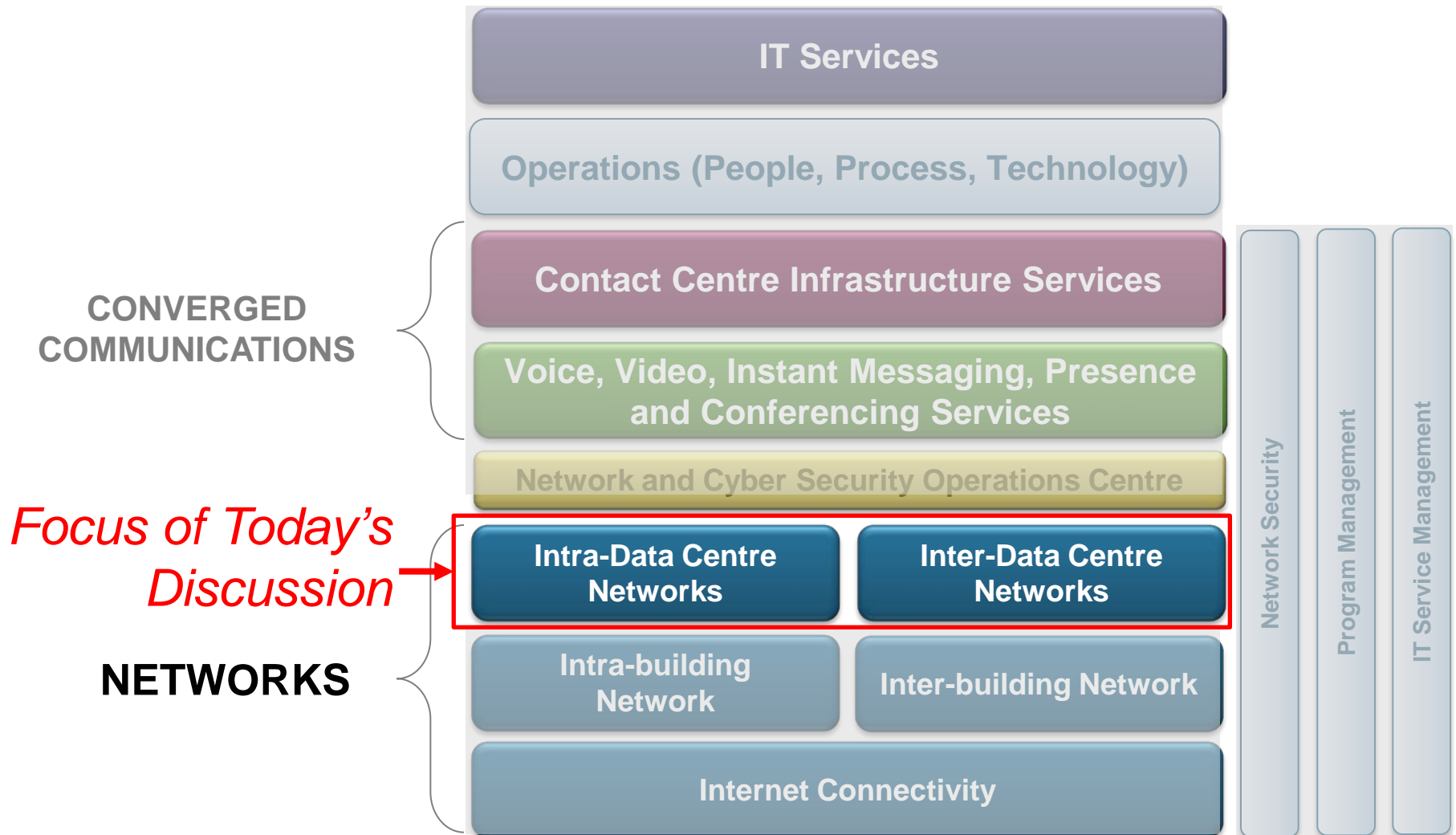# Telecommunications Transformation Program (TTP)
What is the TTP?

- The TTP is responsible for the following:

  - The **transformation, planning and sourcing of telecommunications services** for the Government of Canada

  - The **strategies** for delivering those services, with a view to centralize their administration, rationalize service delivery to achieve greater efficiencies, reduce costs, minimize risks, and improve security and service quality

- One of the main objectives of the TTP is to **design and build an integrated telecommunications network** to support Government of Canada operations

- The TTP is comprised of many service elements with the principle elements being inter-building networks, local area networks, **data centre networks,** workplace communications services, videoconferencing and contact centre infrastructure services

Telecommunications Transformation Program
Conceptual Framework

FRAMEWORK ELEMENTS

IT Services

Operations (People, Process, Technology)

CONVERGED COMMUNICATIONS

Contact Centre Infrastructure Services

Voice, Video, Instant Messaging, Presence and Conferencing Services

Network and Cyber Security Operations Centre

Focus of Today's Discussion →

| **Intra-Data Centre Networks** | **Inter-Data Centre Networks** |

NETWORKS

| **Intra-building Network** | **Inter-building Network** |

Internet Connectivity

Network Security

Program Management

IT Service Management

Telecommunications Transformation Program
What is "Data Centre Networks"?

"Data Centre Networks" is an umbrella term that SSC uses to refer to the two(2) streams: Inter-Data Centre Networks and Intra-Data Centre Networks

1. **Inter-Data Centre Networks:** provides high capacity network **connectivity** *between* **data centres** to ensure **high availability** of mission-critical applications, as well as support for **business continuity**

2. **Intra-Data Centre Networks:** provides secure, low-latency connectivity between compute and storage devices *within* **each data centre**

INTER-DATA CENTRE NETWORKS
Overview

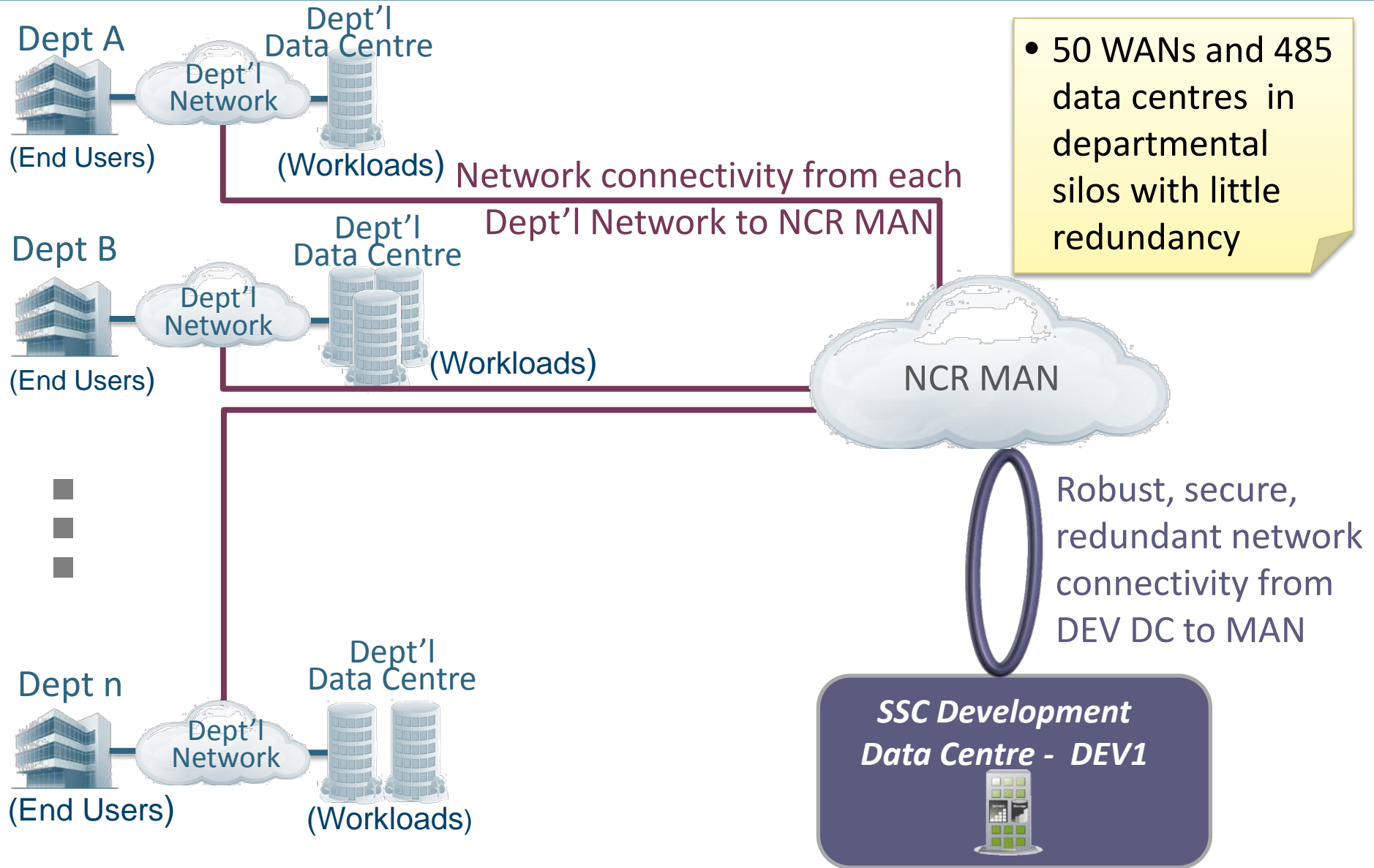# Inter-Data Centre Network Overview
Purpose / Context

The Inter-Data Centre Networks will be used to provide high-capacity network connectivity within Canada:

- **To provide connectivity between enterprise Data Centres within pairs** to allow them to operate in tandem with duplicated / synchronized computing and storage infrastructure providing workload sharing and a highly available environment

- **To provide connectivity between enterprise Data Centre pairs** to provide backup, disaster recovery and business continuity
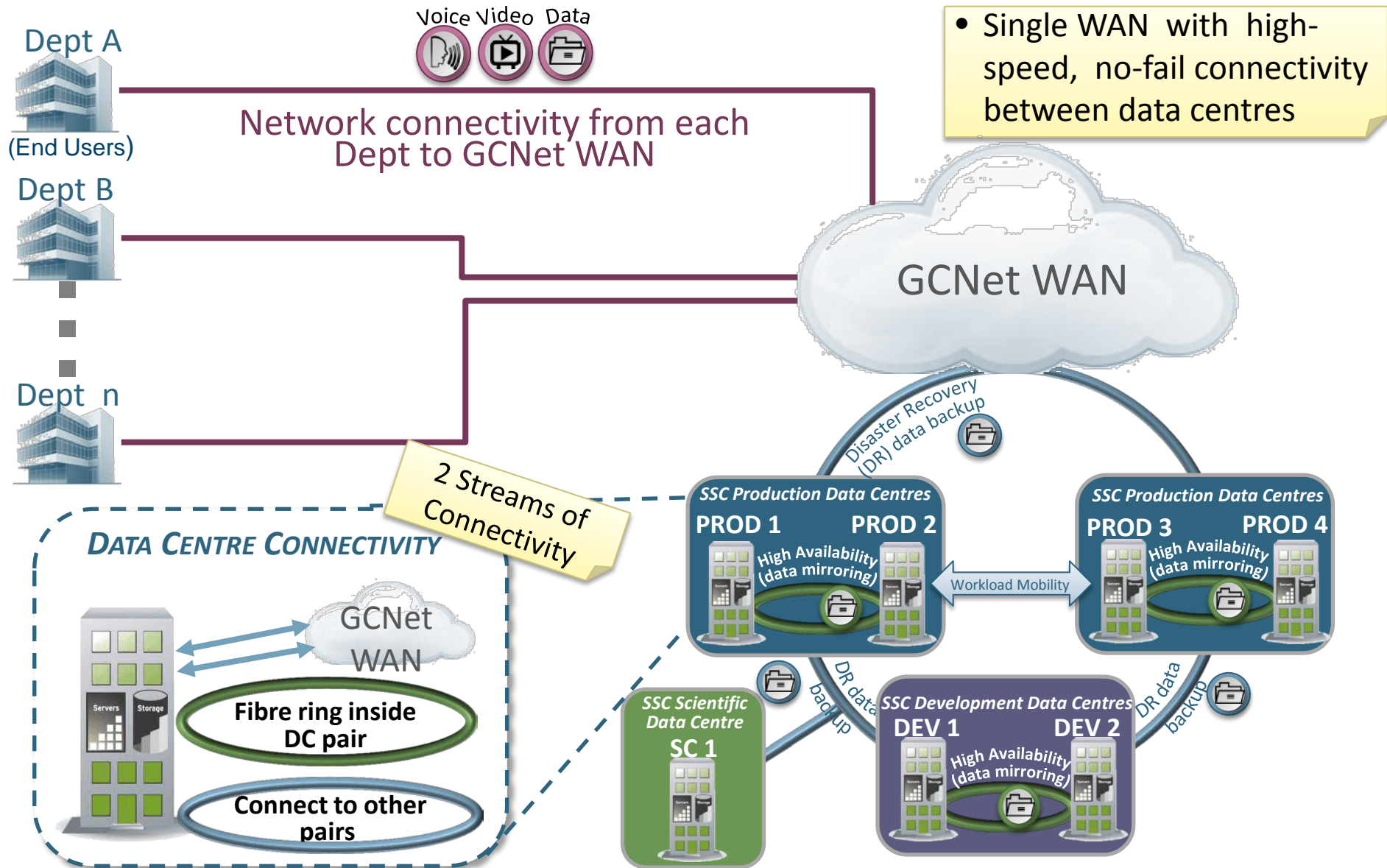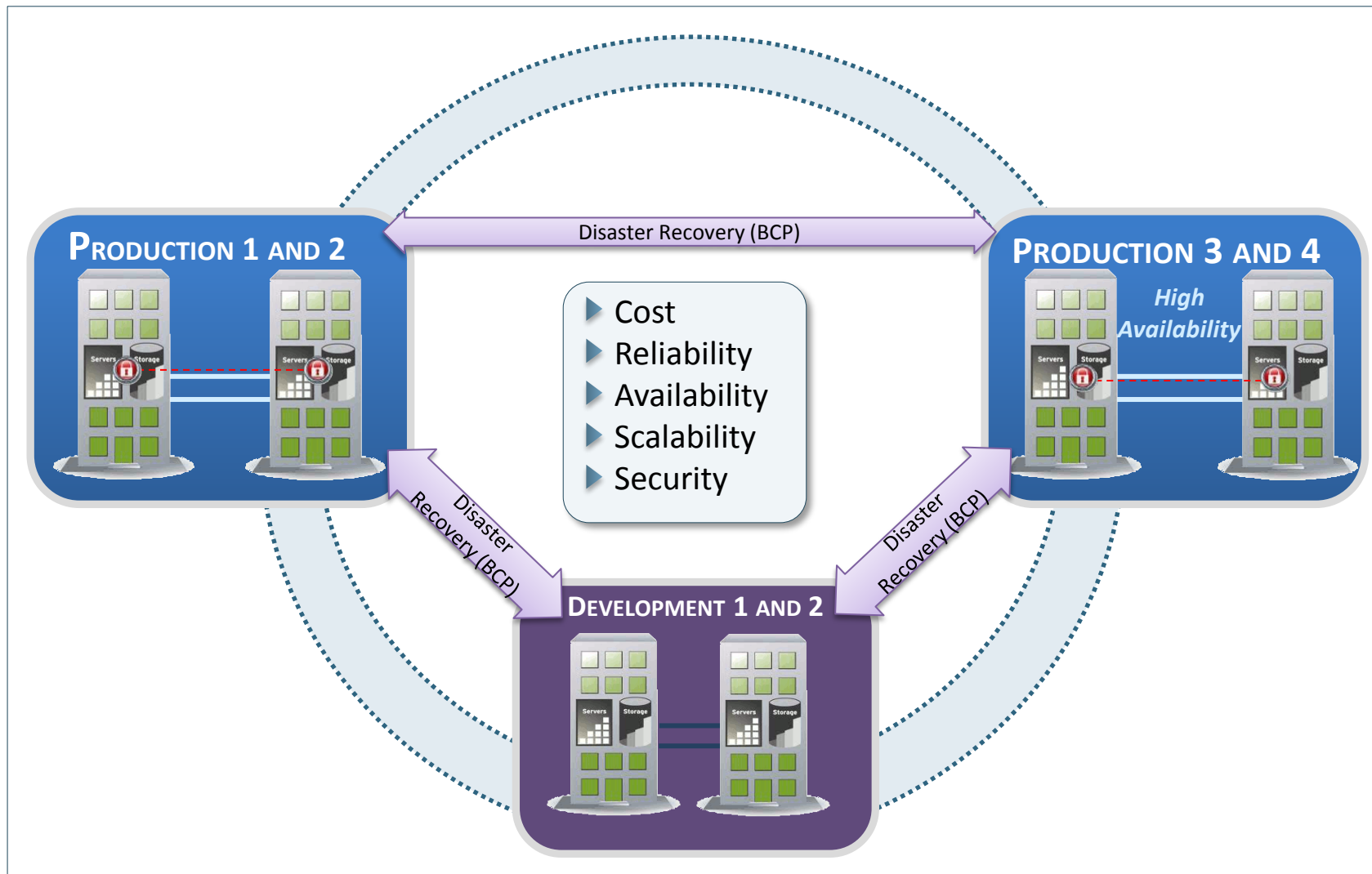
Inter-Data Centre Networks Overview
Current State

Dept A

(End Users)

Dept'l Network

Dept'l Data Centre

(Workloads)

Network connectivity from each Dept'l Network to NCR MAN

Dept B

(End Users)

Dept'l Network

Dept'l Data Centre

(Workloads)

NCR MAN

Dept n

(End Users)

Dept'l Network

Dept'l Data Centre

(Workloads)

- 50 WANs and 485 data centres in departmental silos with little redundancy

Robust, secure, redundant network connectivity from DEV DC to MAN

SSC Development Data Centre - DEV1

Inter-Data Centre Networks Overview
Target End State

Voice Video Data

Dept A

(End Users)

Network connectivity from each Dept to GCNet WAN

• Single WAN with high-speed, no-fail connectivity between data centres

Dept B

GCNet WAN

Dept n

Disaster Recovery (DR) data backup

2 Streams of Connectivity

DATA CENTRE CONNECTIVITY

SSC Production Data Centres

PROD 1   **PROD 2**

High Availability (data mirroring)

SSC Production Data Centres

PROD 3   **PROD 4**

High Availability (data mirroring)

Workload Mobility

GCNet WAN

Servers Storage

Fibre ring inside DC pair

Connect to other pairs

DR data backup

DR data backup

SSC Scientific Data Centre

SC 1

SSC Development Data Centres

DEV 1   **DEV 2**

High Availability (data mirroring)

Inter-Data Centre Network Overview
Target State - Connectivity between Pairs

PRODUCTION 1 AND 2

Disaster Recovery (BCP)

PRODUCTION 3 AND 4

High Availability

▶ Cost
▶ Reliability
▶ Availability
▶ Scalability
▶ Security

Disaster Recovery (BCP)

Disaster Recovery (BCP)

DEVELOPMENT 1 AND 2

- The Data Centre Network within each pair is to provide capacity, agility and flexibility required by Enterprise High Availability applications

Two different service providers with two different paths
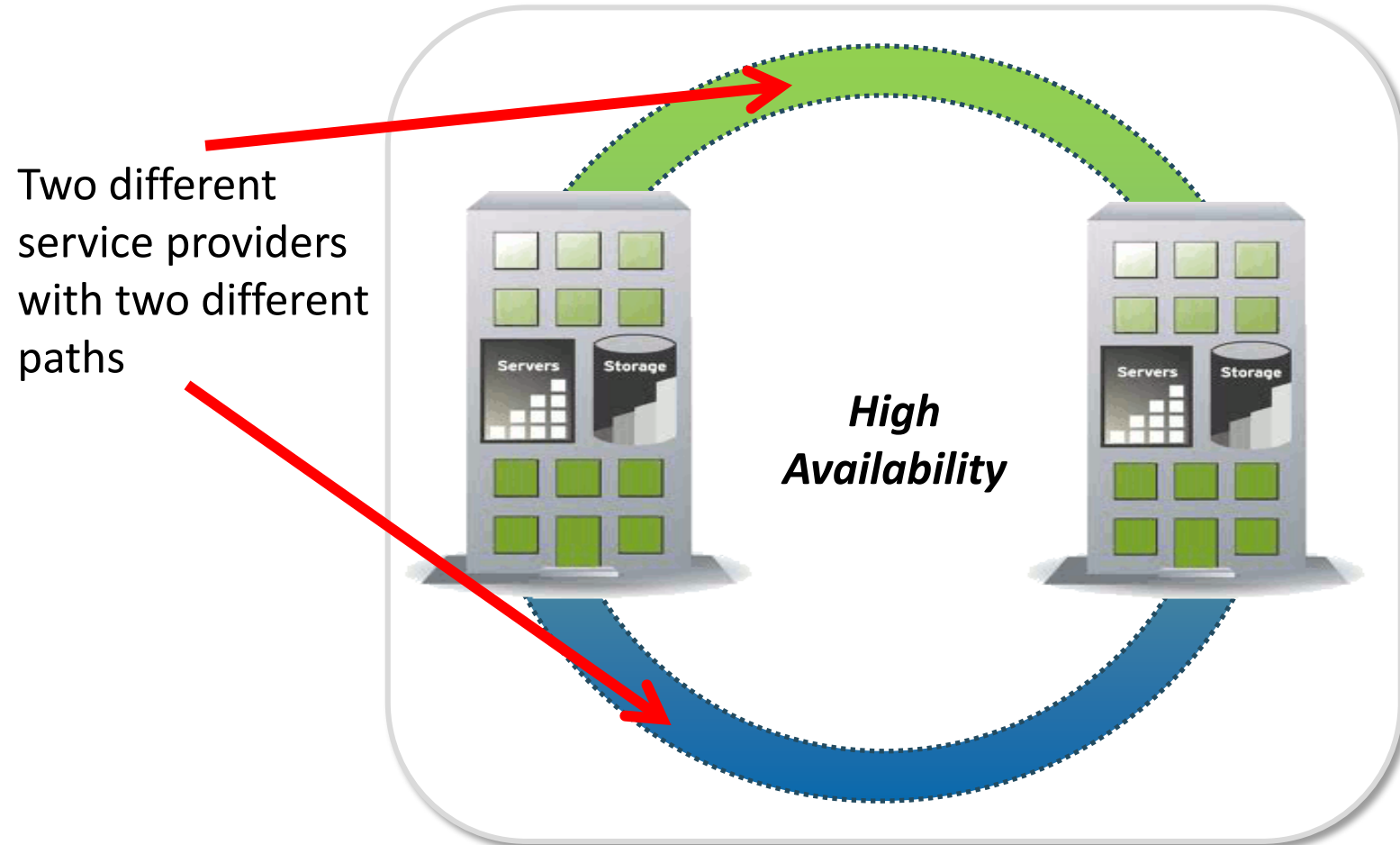
High Availability

Inter Data Centre Networks Overview
End State Requirements

- High-capacity, high availability Open Systems Interconnection (OSI) Layer 2 /Layer 3 services between Data Centres

- Service levels for applications and services requiring real-time sensitive networking (e.g. availability, latency, jitter)

- Traffic isolation and network resource tracking differentiated by security levels

- Compatibility with deployed and anticipated network technologies and protocols

- Monitoring capability to allow real time and historical analysis of network traffic and performance

INTER-DATA CENTRE NETWORKS

Key Discussion Topics and Questions:

1. *Deployment Model*

2. *High Availability*

3. *Contract(s) Period*
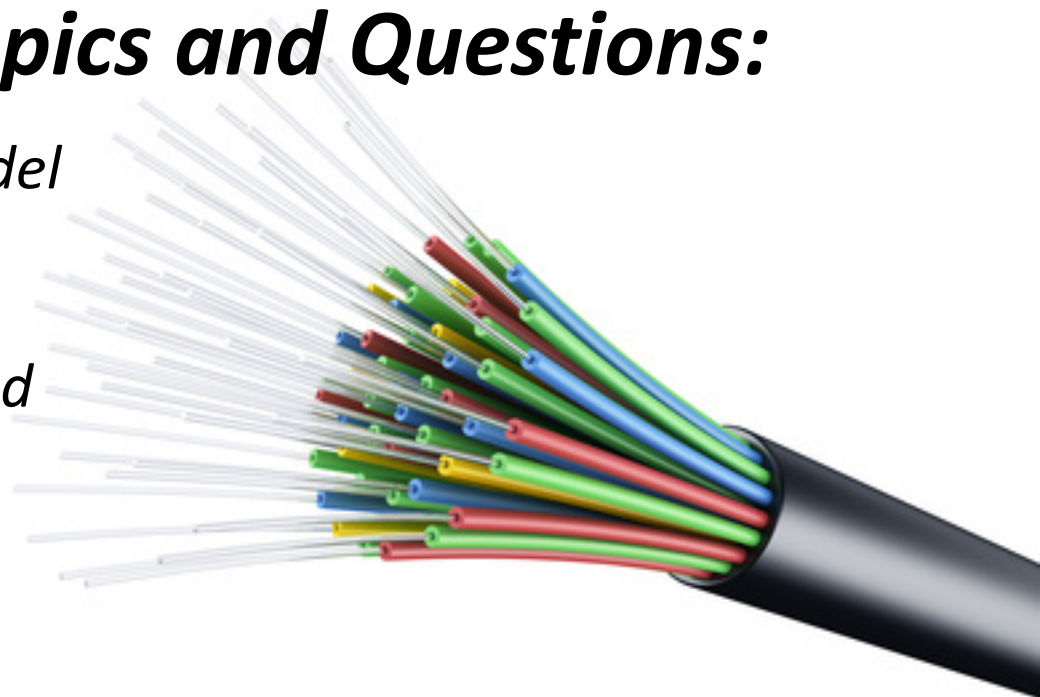
Inter-Data Centre Networks Discussion Topics
Deployment Model – Considerations

- What are the **benefits, technical challenges**, **requirements** and **recommended pricing model** for successful deployment and ongoing support of each deployment model?

1 *Outsourced / Fully Managed*

Third parties design, provide and operate the solution(s) through a managed service

EXAMPLE:
Lease fibre and infrastructure through a managed service and out-source design and operations

2 *Co-Managed / Hybrid*

SSC in-house resources deliver parts of the service on GC-owned infrastructure while the remainder is delivered by a third party vendor

EXAMPLE:
Buy infrastructure and lease dark fibre through a managed service and SSC in-house resources design and operate solutions

3 *In-sourced / In-House*

Design and deliver the solution by in-house SSC resources using SSC acquired infrastructure components

EXAMPLE:
Buy or lease fibre and/or infrastructure, and SSC in-house resources build and operate solutions

Inter-Data Centre Networks Discussion Topics
High Availability and Disaster Recovery
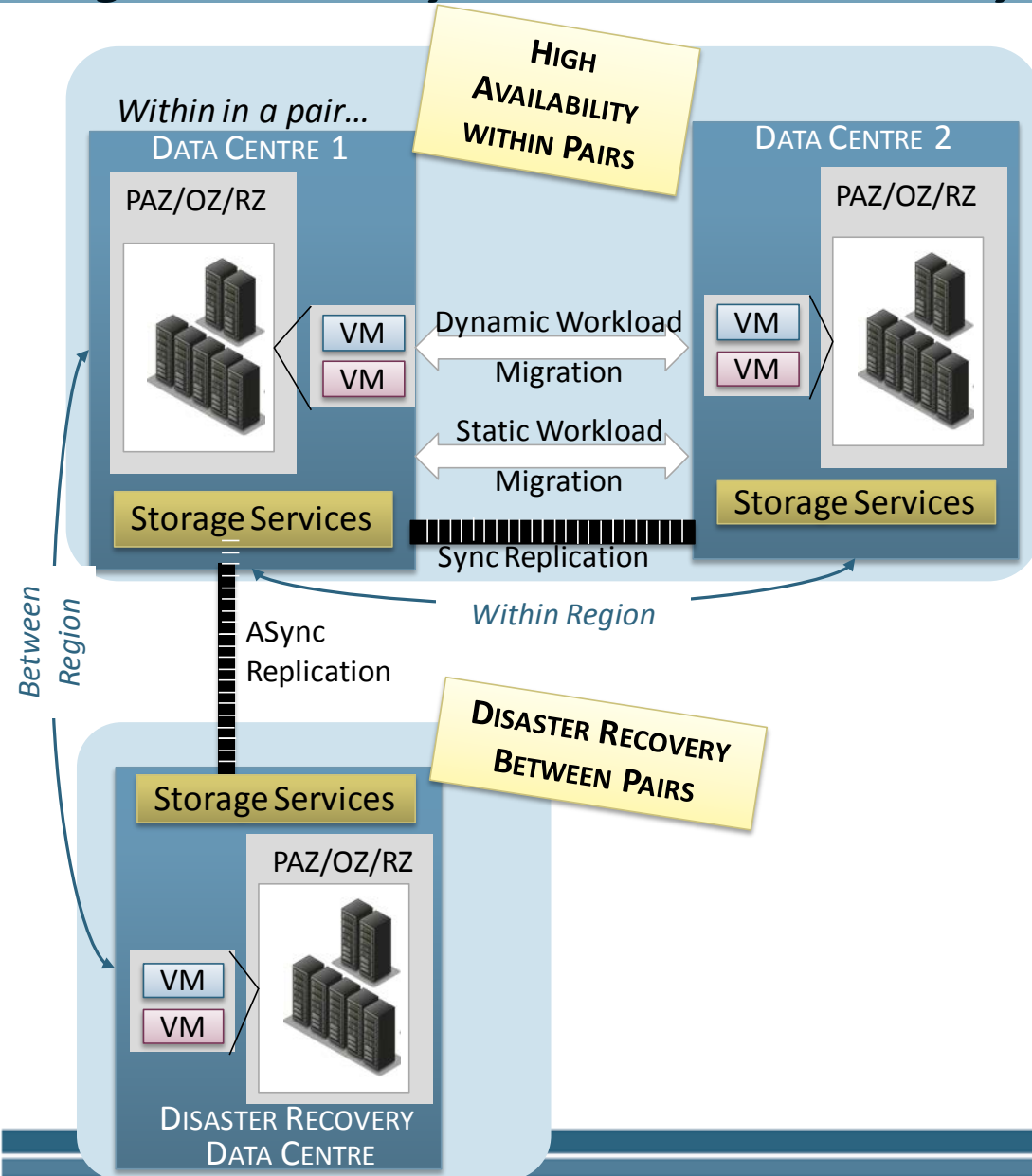
HIGH AVAILABILITY WITHIN PAIRS

Within in a pair…

DATA CENTRE 1

PAZ/OZ/RZ

VM
VM

DATA CENTRE 2

PAZ/OZ/RZ

VM
VM

Dynamic Workload Migration

Static Workload Migration

Storage Services

Storage Services

Sync Replication

Within Region

Between Region

ASync Replication

DISASTER RECOVERY BETWEEN PAIRS

Storage Services

PAZ/OZ/RZ

VM
VM

DISASTER RECOVERY DATA CENTRE

1. For high availability, are two suppliers recommended for the "no fail" connections between the paired Data Centres (DCs)?

2. What is the maximum distance allowed between DCs to deliver High Availability services and meet service levels?

3. What is the recommended architecture for connecting a DC pair?

4. How would you address the Disaster Recovery/Business Continuity requirements between the DC pairs?

Contract Period

- Recommended contract length(s) (including option years)?
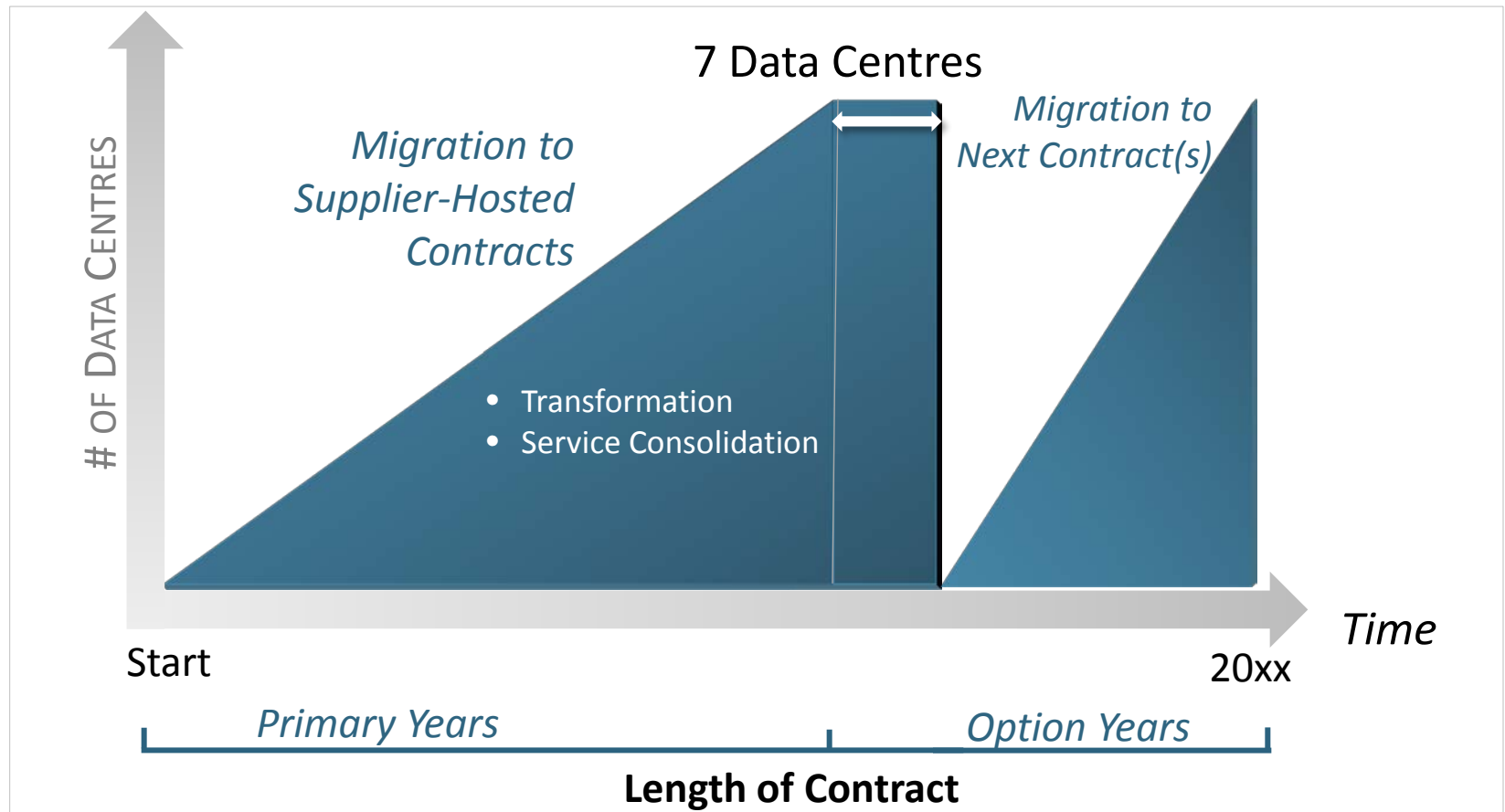
Inter-Data Centre Networks Discussion Topics
Key Questions for Industry Feedback

<u>*OPERATIONAL/TECHNICAL*</u>:

1. For high availability, are two suppliers recommended for the "no fail" connections between the paired DCs?

2. What other measures, other than redundant links, should the Crown look at to safeguard the integrity of the data between the data centres (encryption and various security levels)? What are the impacts of using encryption on an inter-data centre link?

3. What are the recommended service levels for these links and the cost implications?

4. Are there technical restrictions or limitations with respect to the type of data being transmitted/ exchanged over these links ?

<u>OPERATIONAL/TECHNICAL</u>:

5. What footprint would you require at our DCs for your equipment?

6. What is the maximum distance recommended between High Availability DCs to deliver services and meet service levels?

7. What value-added services (if any) would you recommend being incorporated?

PROCUREMENT:

1. What are the technical challenges and recommended pricing model for a successful deployment and ongoing support of a fully managed (out-sourced) Inter-DCN?

2. What are the pros and cons of a fully managed vs. hybrid vs. in house model Inter-DCN?

3. Identify the advantages and disadvantages for:
    - Buying fibre and infrastructure, and building and operating solutions in-house
    - Buying infrastructure and leasing dark fibre through a managed service and designing and operating in-house
    - Leasing fibre and infrastructure through a managed service and out-sourcing design and operations

PROCUREMENT:

4. Please provide your recommendations on contract length. What are the advantages and disadvantages with this duration? What Pricing Model would be most beneficial to Canada? Are regular pricing reviews at fixed intervals over the period of contract(s) advisable?

5. Provide recommendations for requirements to maximize competitiveness and minimize costs. What are the factors that drive rates up?

6. What recommendations can be provided on the approach for the technical evaluation of supplier proposals?

Break – 15 Minutes

Coffee and refreshments are available in the lobby.

Please return to your seat by 2:45 p.m.

INTRA-DATA CENTRE NETWORKS
Overview

Intra-Data Centre Networks Overview
Purpose / Context

- The Intra-DC Network plays a critical role in the evolution of the SSC Data Center and will:

  - Provide a transport service to the data center and foundational elements

  - Provide users with access to on-demand data centre services and resources through a virtualized network infrastructure

  - Provide a secure technology infrastructure and environment to meet program needs and increase confidentiality and integrity of information

- The Intra-DC Network will be fully established in alignment with current Data Centre Consolidation Plans

Network infrastructure needs to be reliable, scalable, resilient and highly available

Intra-Data Centre Networks Overview
Current State

Dept A

(End Users)

Dept'l
Network

Dept'l
Data Centre

(Workloads)

DEPT A

DATA

CENTRE

Dept B

(End Users)

Dept'l
Network

Dept'l
Data Centre

(Workloads)

DEPT B
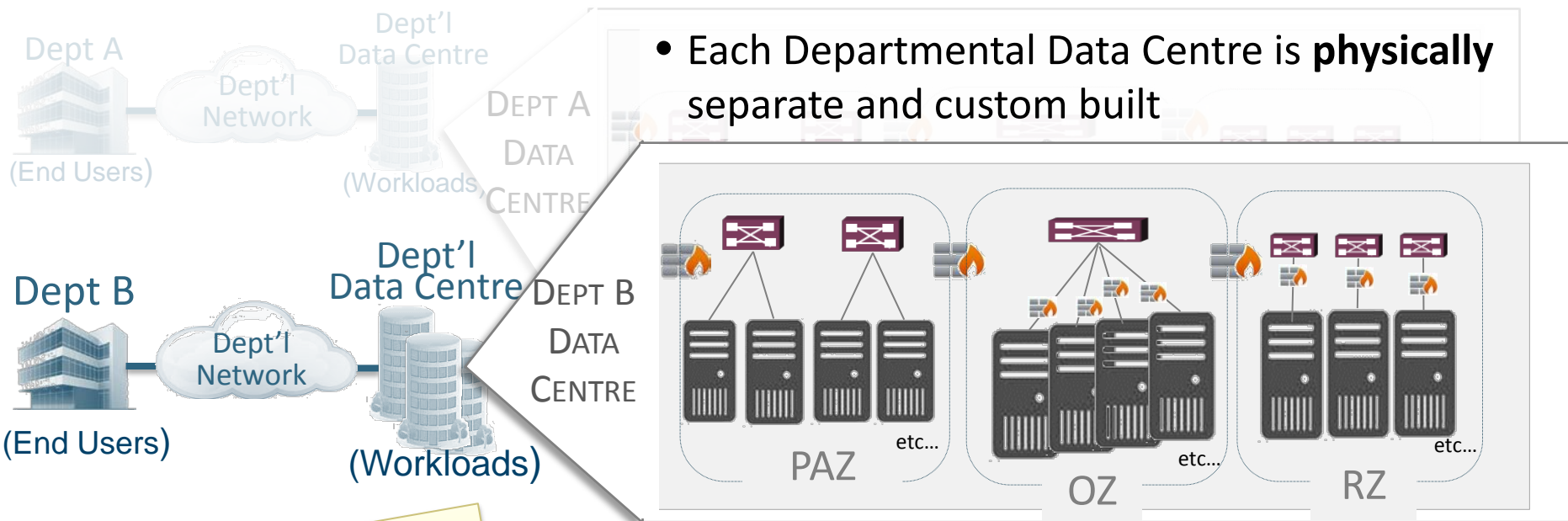
DATA

CENTRE

• Each Departmental Data Centre is **physically** separate and custom built

PAZ

etc…

OZ

etc…

RZ

etc…

• **50 WANs and 485 data centres in departmental silos with little redundancy**

DEPT N

DATA

CENTRE

Dept'l
Network

Dept'l
Data Centre

• Common Characteristics / Issues:
  – Physical Redundancy and Separation
  – Duplication / Replication
  – Frequent under utilisation
  – Non Standard architecture, equipment, etc…
  – Separate physical firewalls and load balancers

etc…

OZ

etc…

RZ

etc…

LEGEND:

PAZ = Public Access Zone
OZ = Operational Zone
RZ = Restricted Zone

Switch

Processor

Firewall

Dept'l
Network
Provides connectivity
within single department
(multiple sites)

Intra-Data Centre Networks Overview
Target State - Virtualized Environment

- Common Characteristics / Benefits
  - Common infrastructure
  - Deployment through virtual networks
  - Maximize utilisation (capacity management)
  - Virtual firewalls between the zones
  - Performance measurement
  - Scalable and flexible
  - Audit and reporting
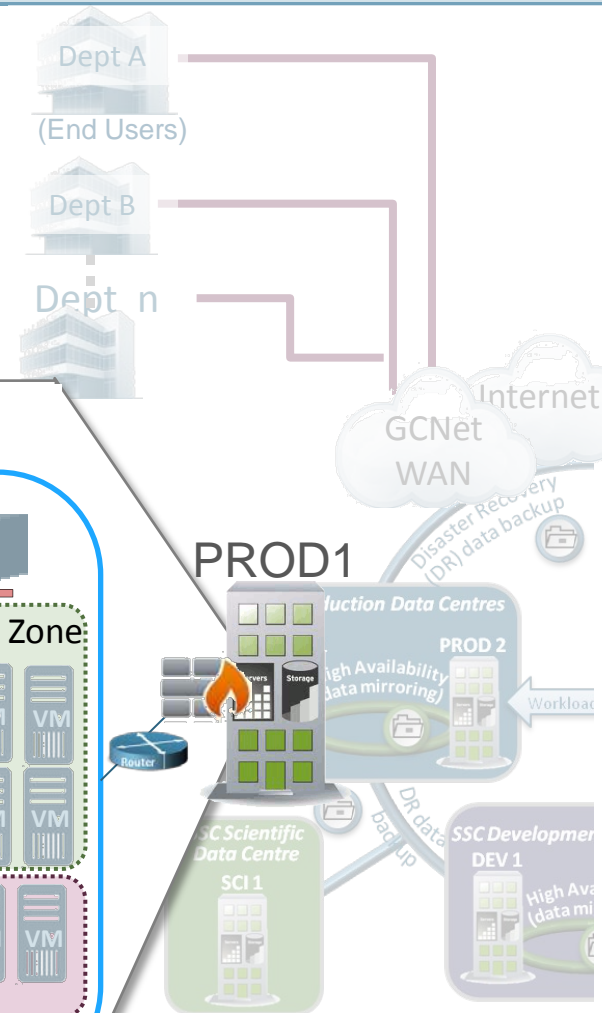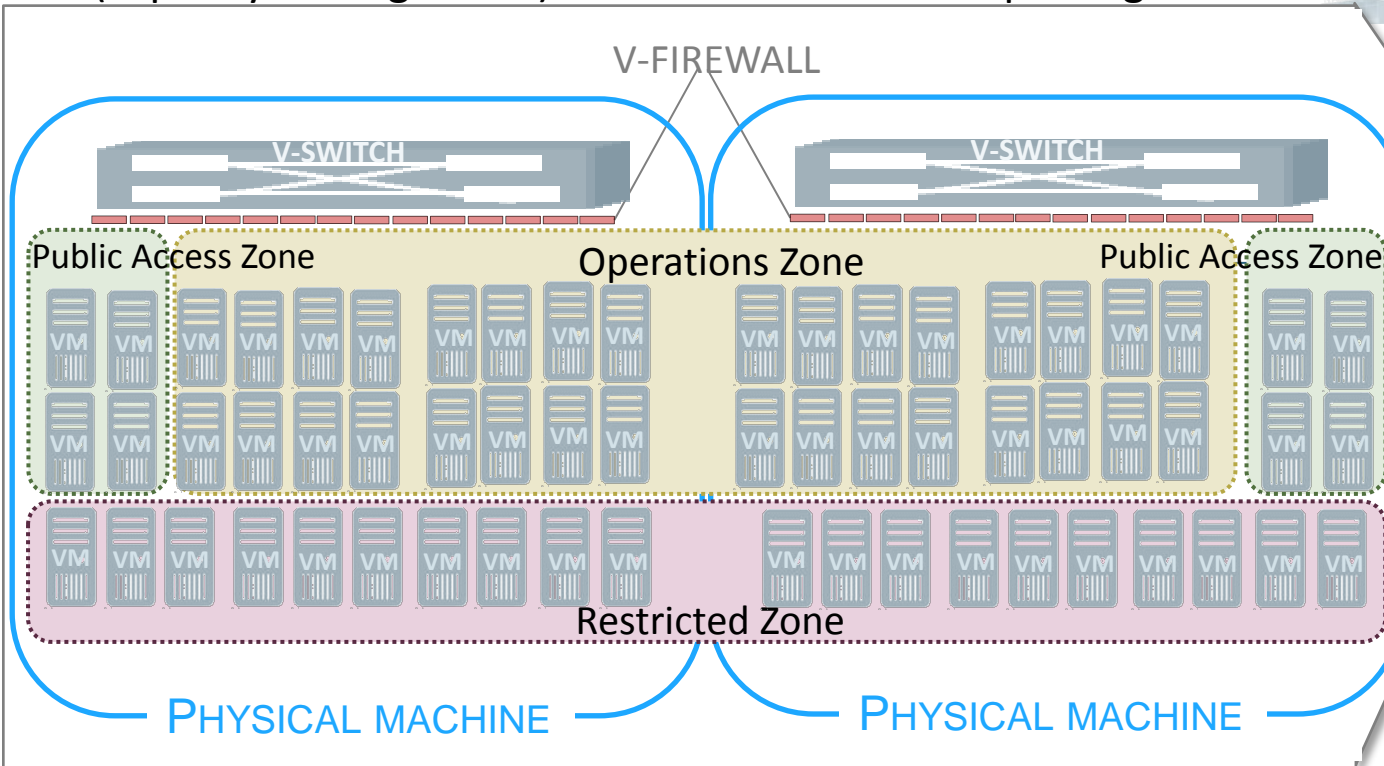
- Provide network access to business workloads, Internet access, shared applications in cost-effective and secure manner

- Infrastructure must be flexible, scalable and "future proof"

- Must support multi-tenancy and controlled access to data (must provide capability to have organizations/users access virtual slices of compute, storage and network that are kept private from other organizations/users)

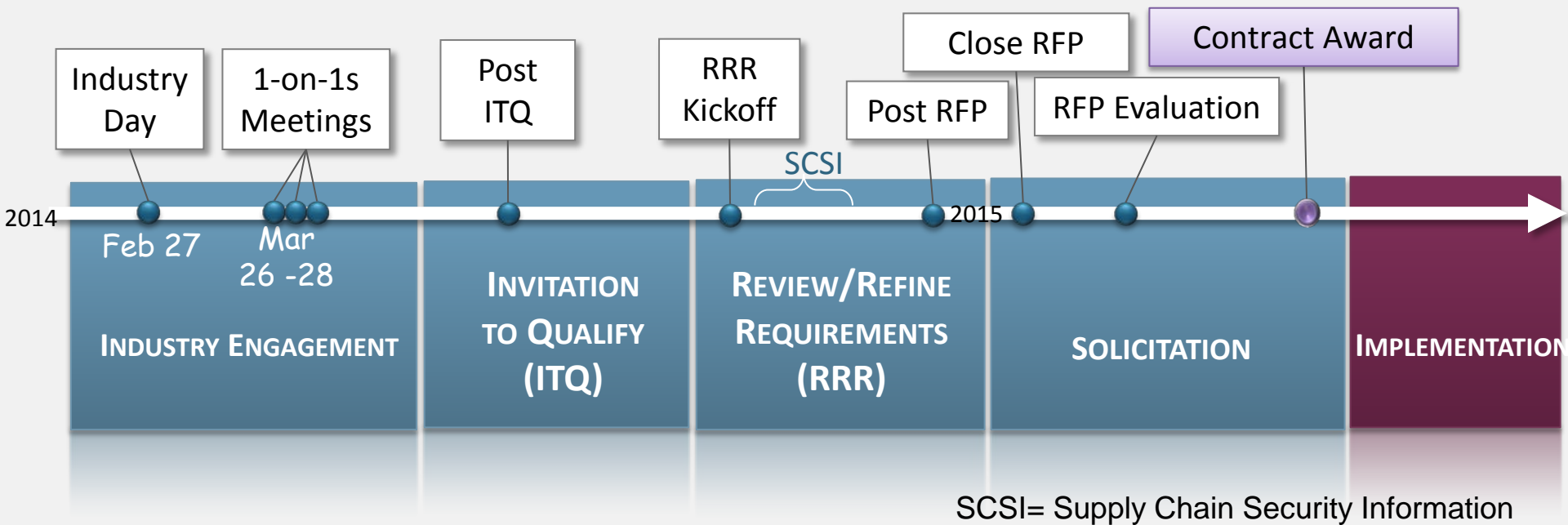- Support an open architecture to ensure flexibility and compatibility

Intra Data Centre Networks Overview
End State Requirements *(continued)*

- Provide high availability access to IT systems, applications and information and provide IT Service and Business Continuity for mission critical applications

- Network equipment must be able to support cloud services and service virtualization

- Support the ability for orchestrating deployment of compute and storage services

- Flexible and responsive network infrastructure to meet changing business needs including the ability to dynamically adapt to meet network traffic demand

Data Centre Networks Overview
Procurement Timeline to Contract Award(s)

Industry Day

1-on-1s Meetings

Post ITQ

RRR Kickoff

Close RFP

Contract Award

Post RFP

RFP Evaluation

SCSI

2014

Feb 27

Mar 26 -28

2015

INDUSTRY ENGAGEMENT

INVITATION TO QUALIFY (ITQ)

REVIEW/REFINE REQUIREMENTS (RRR)

SOLICITATION

IMPLEMENTATION

SCSI= Supply Chain Security Information

- Both streams of Data Centre Networks (Inter and Intra) will align with the proposed procurement schedule, but will be considered separate procurements

- Supply Chain Security Information (SCSI) assessment will be conducted during the RRR phase to ensure all IT Products meet Canada's security and supply chain standards (more detail will be provided in the following SCSI presentation)

INTRA-DATA CENTRE NETWORKS

Key Discussion Topics and Questions:

1. Deployment Model

2. Emerging Technologies

3. Pricing Methodology

4. Contract(s) Period

Intra-Data Centre Networks Discussion Topics
Deployment Model

- What are the **benefits, technical challenges**, **requirements** and **recommended pricing model** for successful deployment and ongoing support of each deployment model?

1 *Outsourced / Fully Managed*

A third party designs, implements and operates the solution in GC Data Centres

EXAMPLE:
Third party vendor provides infrastructure components, designs, implements and operates solution

2 *Co-Managed / Hybrid*

SSC in-house resources deliver parts of the service on GC-owned infrastructure while the remainder is delivered by a third party vendor

EXAMPLE:
Solution delivered by third party vendor and SSC in-house resources implement and operate

3 *Insourced / In-House*

Solution designed and delivered by in-house SSC resources using SSC acquired infrastructure components

EXAMPLE:
Buy infrastructure components/solution and SSC in-house resources build and operate it

Intra-Data Centre Networks Discussion Topics
## *Emerging Technologies*

- To ensure "future proofing", what are the possible technology or service enhancements over the next 5 to 10 years that need to be considered?

- Are the services and equipment scalable and able to support future Software Defined Network (SDN) requirements, and how?

- How can we keep technologies up to date given the length of transformation?

- What are the implications if there is a requirement to have an identical solution in each of the data centre pair?

3 TIER INFRASTRUCTURE

Core

Aggregation

Access
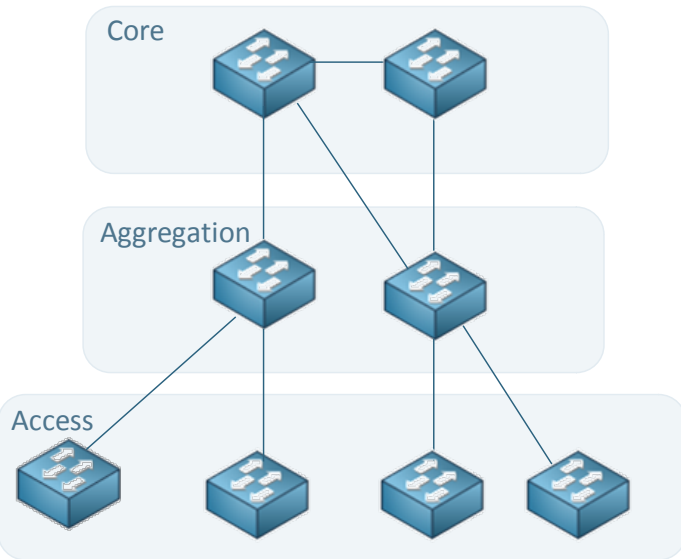
VERSUS

LEAF AND SPINE INFRASTRUCTURE

Spine

Leaf
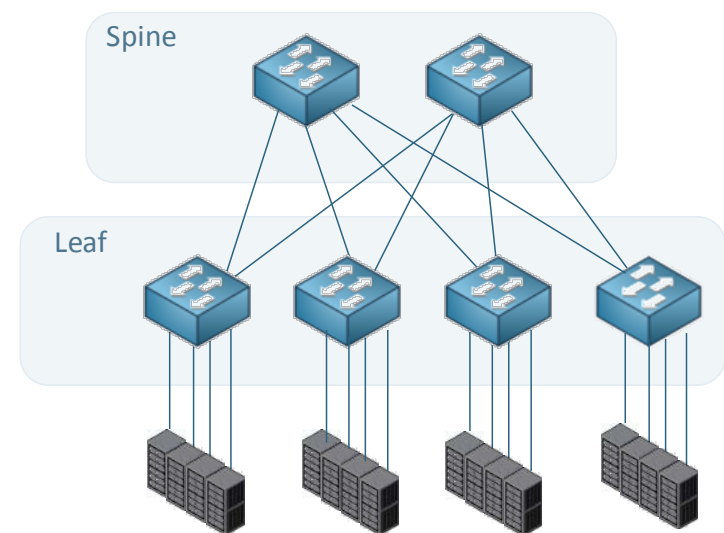
Contract Period

Discussion
Topic
3

- Recommended contract length(s) (including option years)?
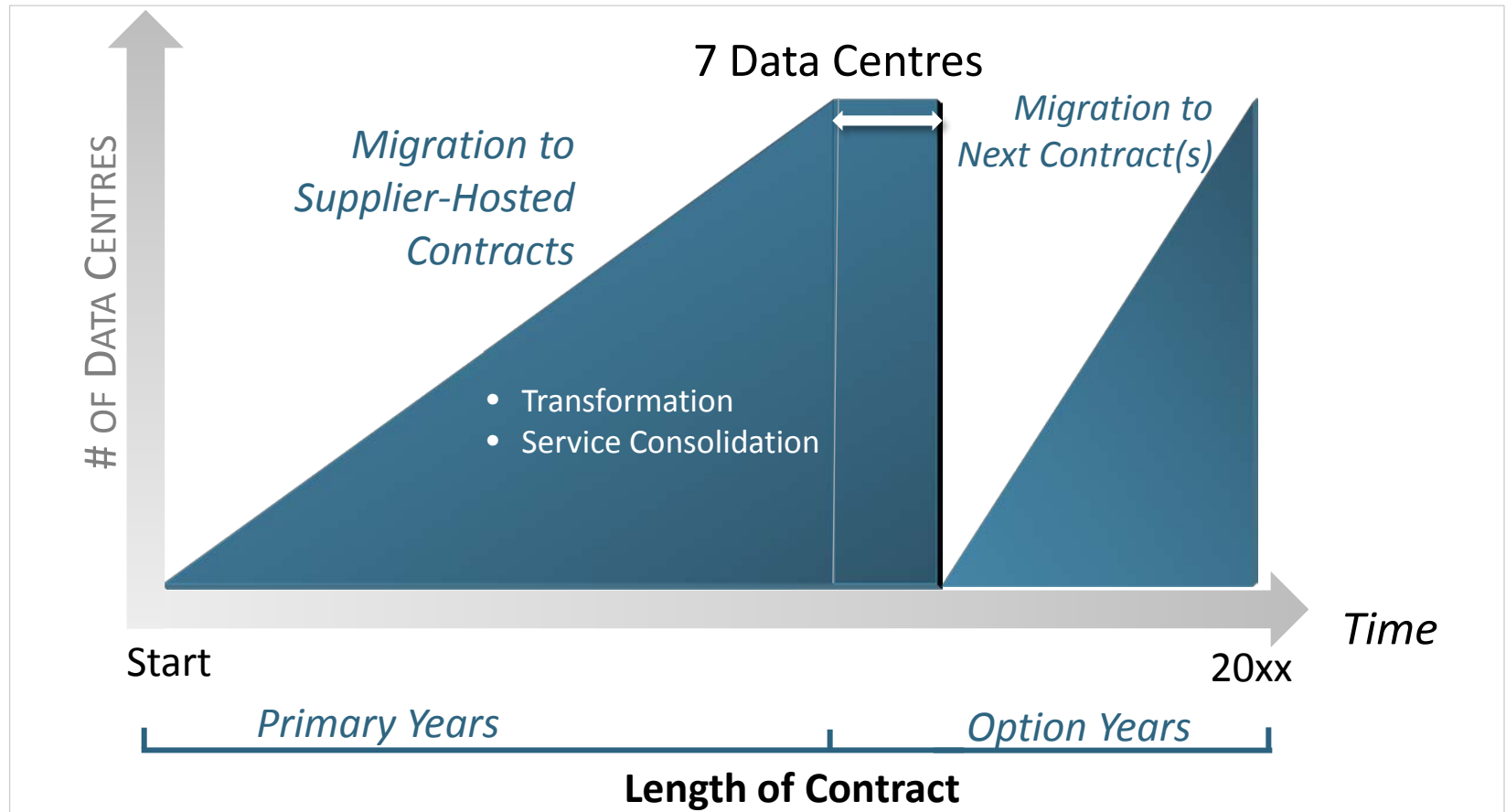
Pricing Model Options

Discussion
Topic
4

- Numerous pricing model options possible (fixed, variable, etc.)

- Are pricing reviews at fixed intervals (based on market benchmarks) over the period of contract(s) advisable?

- What are the factors that drive the rates up?
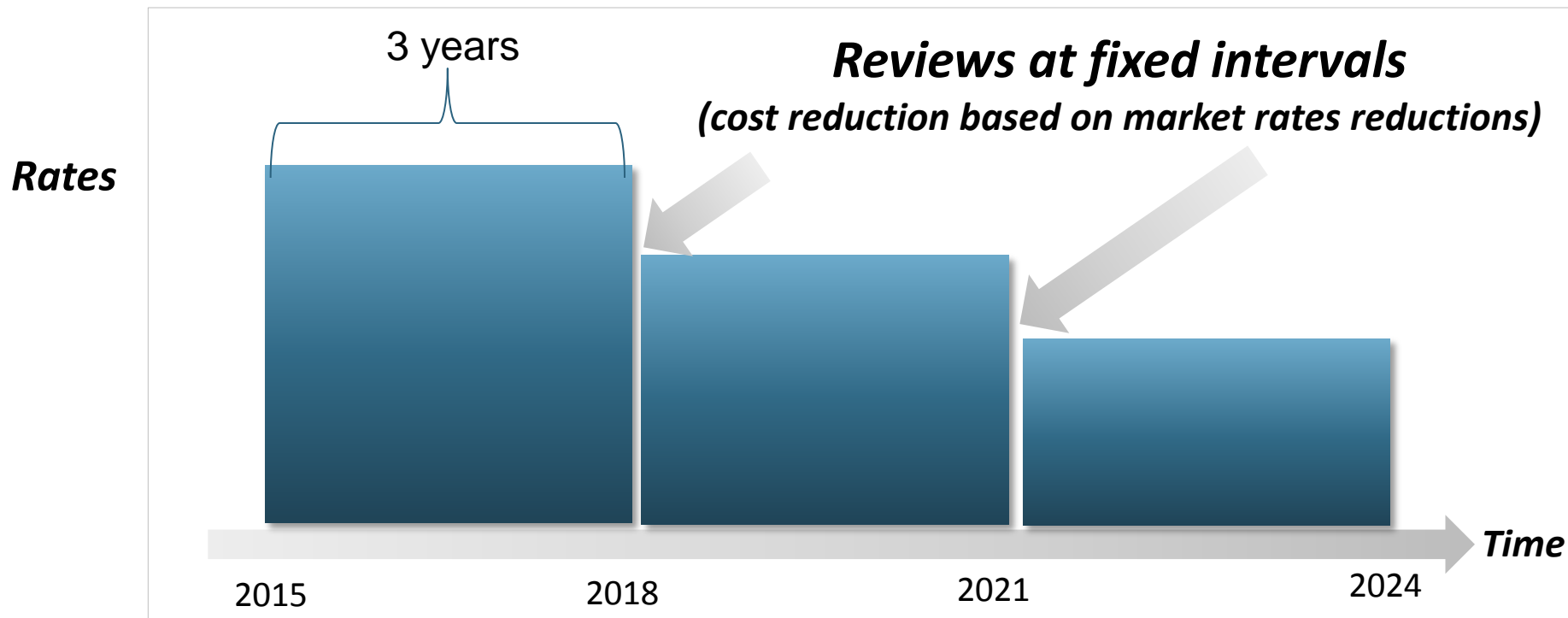
3 years

Rates

Reviews at fixed intervals
(cost reduction based on market rates reductions)

Time

2015   2018   2021   2024

OPERATIONAL/TECHNICAL:

1. Can services be provided by multiple suppliers using multiple vendors' equipment within DC pairs (High Availability)? Across DC pairs (Business Continuity)? Is it a recommended approach ?

2. Are the services and equipment scalable and able to support future Software Defined Network (SDN) requirements, and how?

3. What are the possible technology or service enhancements over the next 5 to 10 years that we may need to consider in our requirements? How can emerging trends/technologies be incorporated into the proposed solutions? How can we keep technologies up to date given the length of transformation?

<u>*OPERATIONAL/TECHNICAL*</u>:

4. What service delivery model would you recommend and why ?

5. What value-added services would you recommend that we should be incorporating?

6. What are some of the strategies to migrate from today's environment to the future environment?

7. What are the perceived barriers to success and risks that require mitigation strategies?

<u>PROCUREMENT</u> :

1. What are the technical challenges and recommended pricing model for successful deployment and ongoing support of a fully managed Intra-DCN ?

2. What are the pros and cons of a fully managed vs. hybrid vs. in-sourced model (including hardware and software)? What are some security implications of a hybrid model?

3. For the hybrid or in-sourced models, please comment on the approach of buying/leasing a solution, rather than equipment. What are the pros and cons of buying vs. leasing a solution/equipment (particularly in the case of in-sourced services)?

4. Provide feedback on the ability to inter-operate based on industry "open" standards within a multi-vendor network services integration. What are the technical challenges when it comes to management?
   - In-house managed
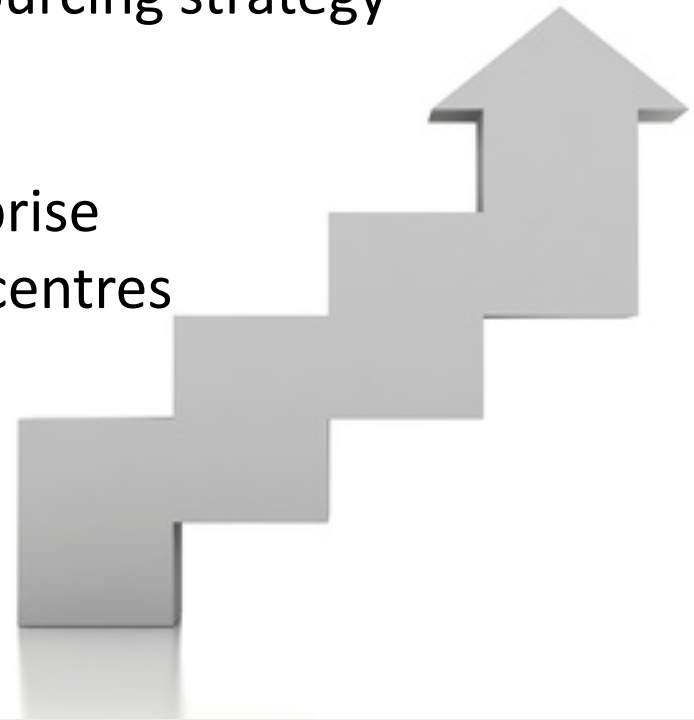   - Out-sourced managed

PROCUREMENT :

5. Provide feedback on proposed procurement approach and timelines, considering existing systems and services

6. Should we have only one prime provider for all enterprise data centres?

7. What Pricing Model would be most beneficial to Canada? Are regular pricing reviews at fixed intervals over the period of contract(s) advisable?

8. What recommendations can be provided on the approach for the technical evaluation of supplier proposals?

9. Provide views or feedback on proposed procurement timelines

Data Centre Networks Industry Engagement
Next Steps

- Industry one-on-one engagements will be held March 26th - 28th to obtain feedback on the discussion topics

- Evaluate input feedback received to refine inter and intra data centre procurement and sourcing strategy

- Proceed with procurement for enterprise solutions to support enterprise data centres in a timely manner

Questions?

(for suppliers only)