The Telco Data Grid: Xeround's Carrier Grade Real-time Database

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Technion IBM

LADIS 2007 Workshop

xeround

The Telco Database Company™

Xeround – The Telco Database Company

- Xeround Systems creates end-to-end innovative database solutions for subscriber-centric real-time event processing in
  - Network-based dynamic subscriber data
  - Service-specific subscriber information
  - Session management and call processing
  - Real-time and prepaid billing
- Xeround presents a quantum leap in cost, performance and scale, resolving technology barriers in today's real-time systems

Xeround's Proposition to Telecom Operators

- Xeround provides a geo-distributed, highly-scalable, mission-critical real-time database
  - Transforming closed silos to scalable and open architectures
  - Enabling convergence of services and networks
  - Driving customer-centric interaction and business
  - Empowering subscriber's context-aware services

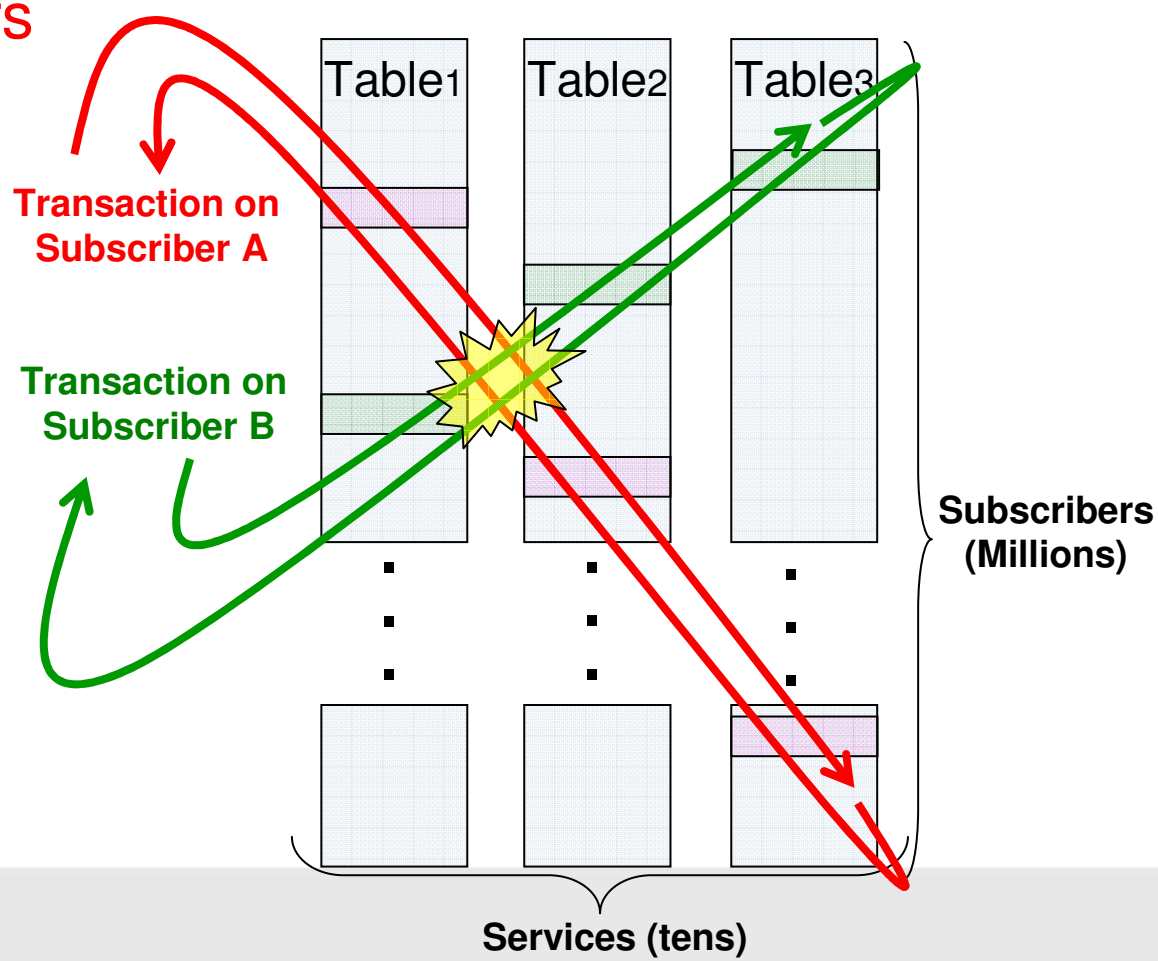
Carrier Grade Real-Time Database

- ✓ Continuous availability
  - >99.999% real-time availability of 100% of subscribers, data and operations
- ✓ Cost-effective massive scalability
  - Linear, predictable and online scalability of subscribers, services & throughput
- ✓ Guaranteed high responsiveness
  - Predictable short read and write latencies even during faults, recovery, scaling and maintenance
- ✓ Network and Geo-distributed
  - From LAN to WAN , Single and cross-location support
- ✓ Transaction handling
  - Full ACID compliant transactions and indexes support in both SQL and LDAP

General Purpose Relation Data Model

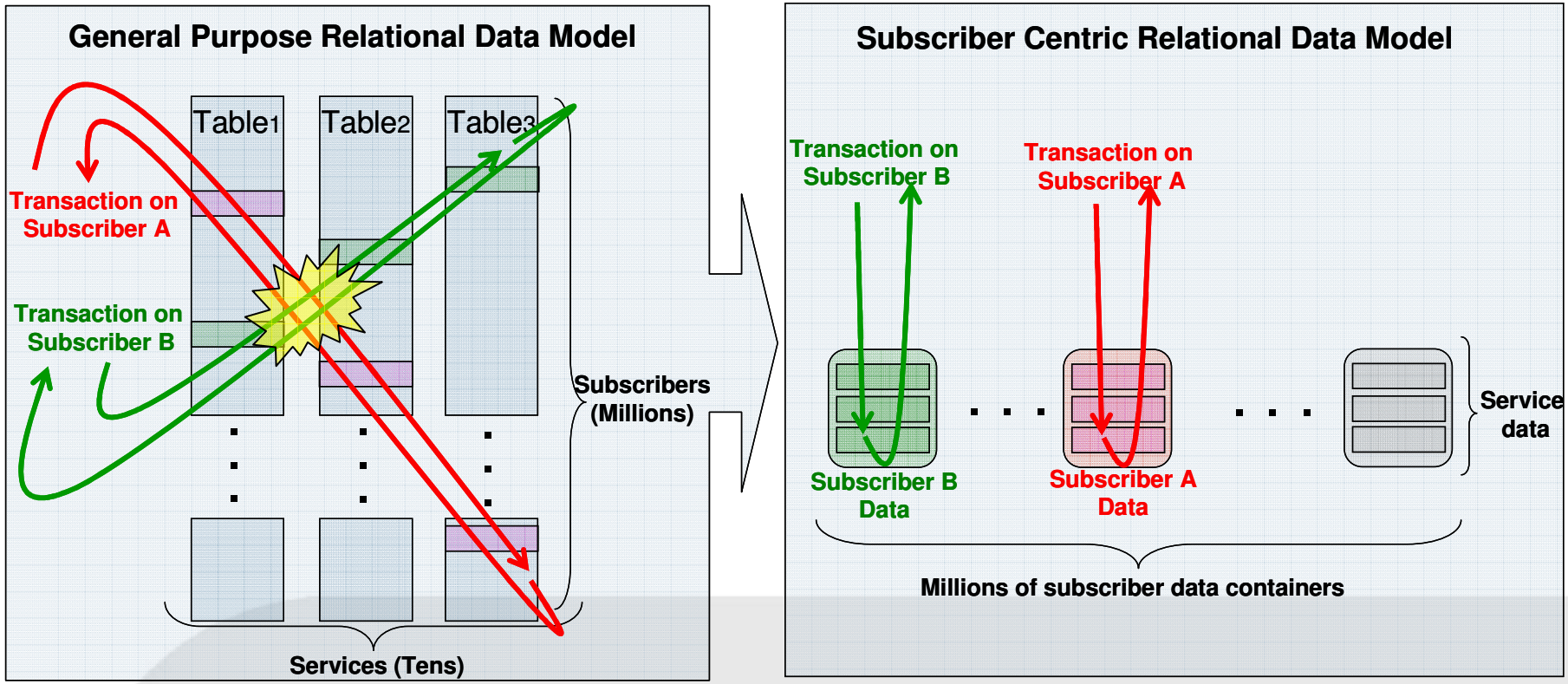
- Table based data model creates contention between independent subscriber based transactions

→ Limits the scalability of real-time transaction processing to 2M-3M subscribers

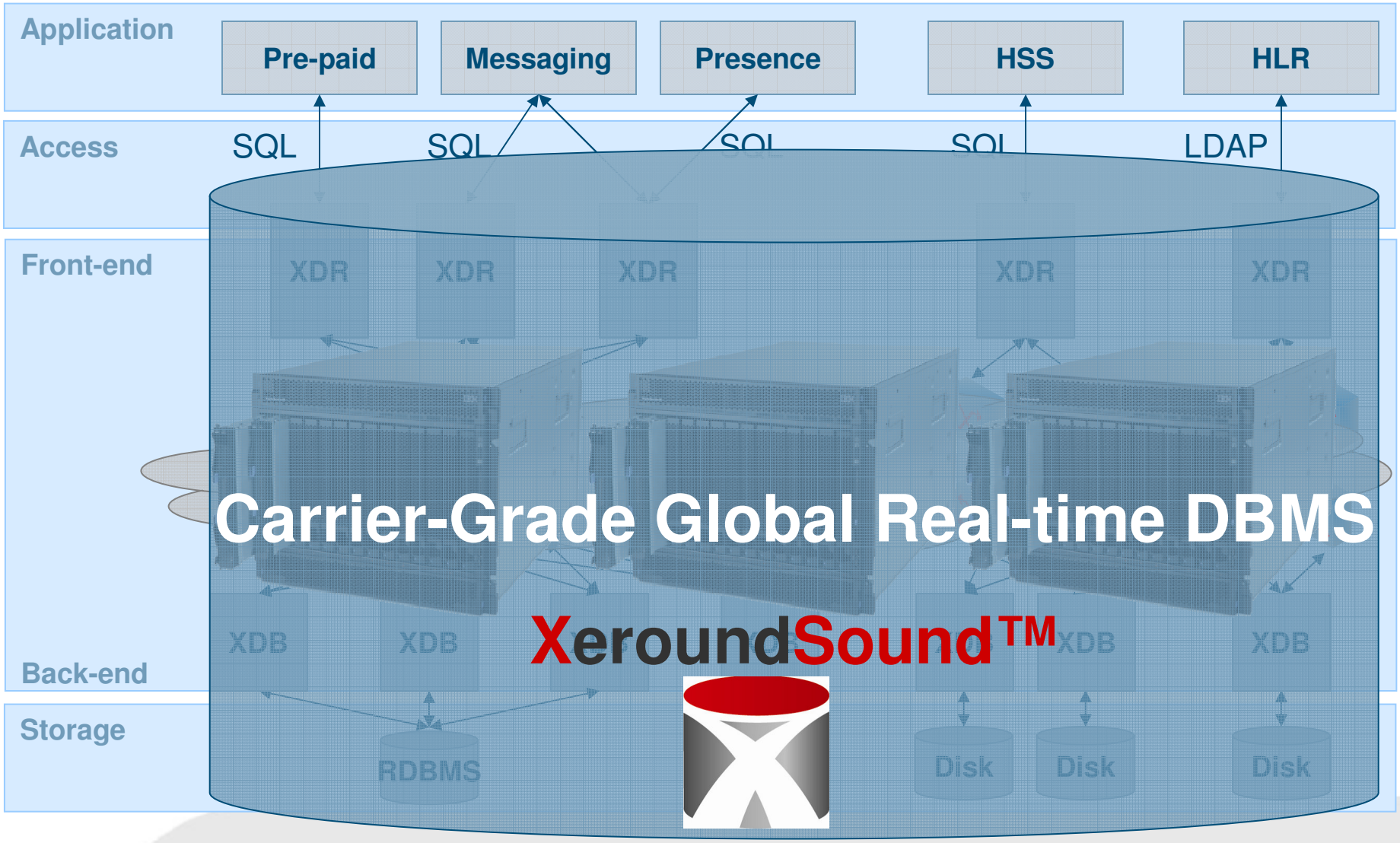


Xeround's Paradigm Shift

- The subscriber oriented usage pattern enables a new relational database architecture:
  - → Subscriber centric data model
    - Cluster data and locks across tables per subscriber
  - → IP oriented transaction processing
    - Transparent partition virtualization by using networking address management concepts



Xeround Standard Based Architecture

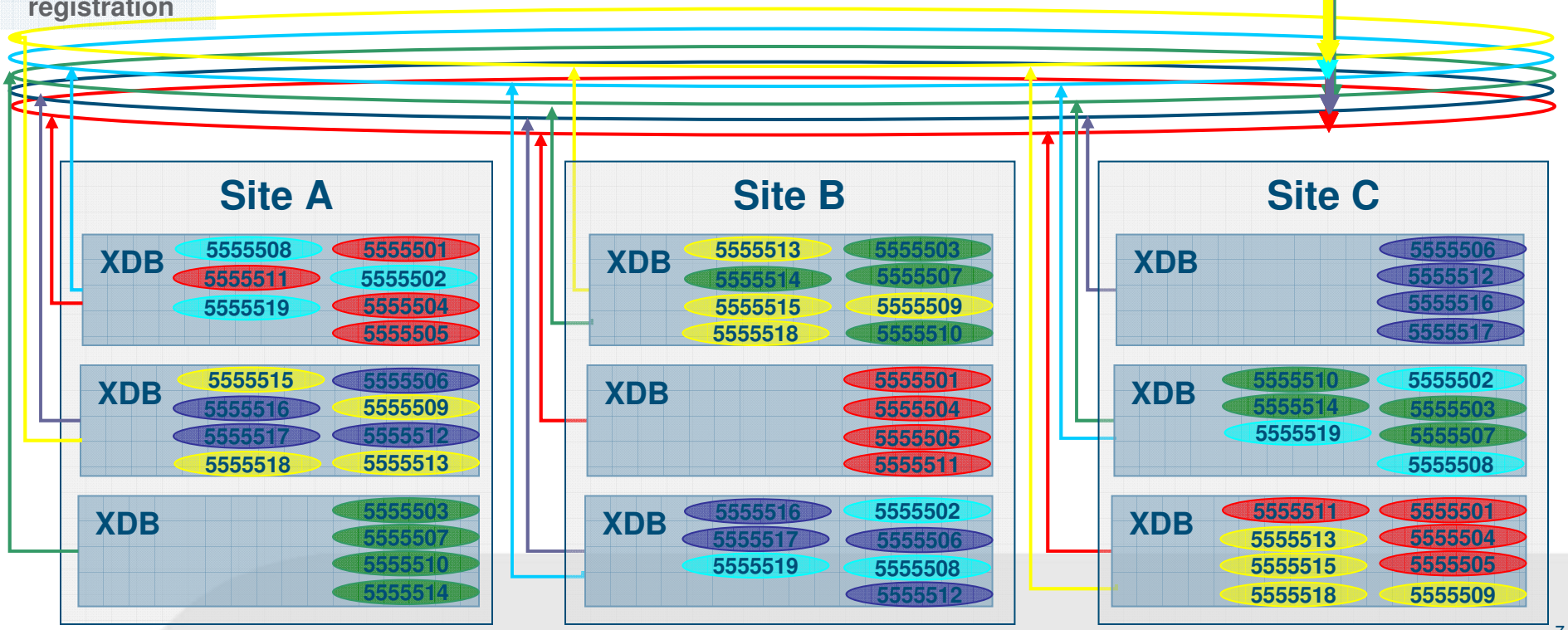


Data Distribution Concepts

Telephone #	SIP Address	Password
5555501	1@Xeround	Xeround1
5555502	2@Xeround	Xeround2
5555503	3@Xeround	Xeround3
5555504	4@Xeround	Xeround4
5555505	5@Xeround	Xeround5
5555506	6@Xeround	Xeround6
5555507	7@Xeround	Xeround7
5555508	8@Xeround	Xeround8
5555509	9@Xeround	Xeround9
5555510	10@Xeround	Xeround10
5555511	11@Xeround	Xeround11
5555512	12@Xeround	Xeround12
5555513	13@Xeround	Xeround13
5555514	14@Xeround	Xeround14
5555515	15@Xeround	Xeround15
5555516	16@Xeround	Xeround16
5555517	17@Xeround	Xeround17
5555518	18@Xeround	Xeround18
5555519	19@Xeround	Xeround19

Data hashing

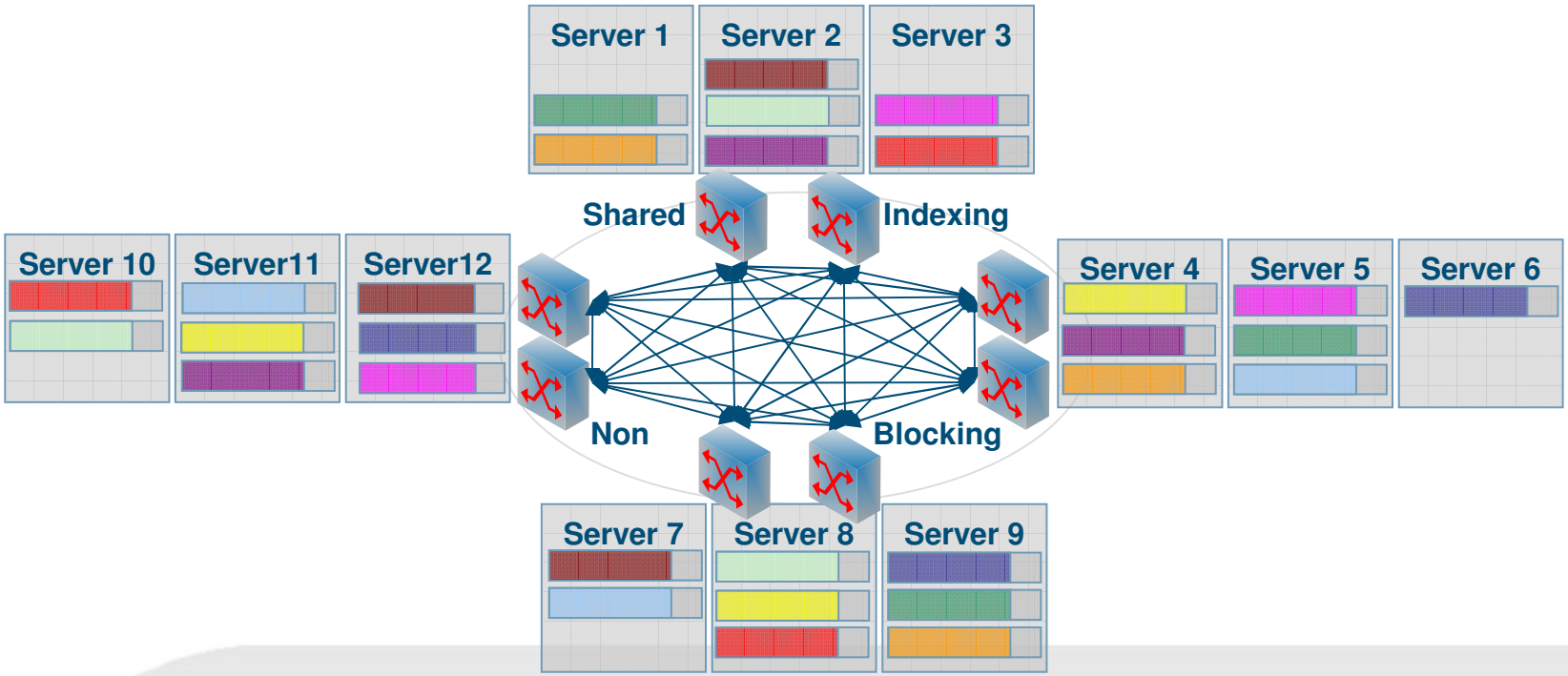
Resource registration



In-network Database Technology (Pat. Pen.)

Share Everything- **Share Something** – Share Nothing

- Decoupling data partitioning from resource partitioning
- Virtual partitioning reduces application complexity
- Partitioning of indexing information



Innovation

(Patent Pending - 2/06 US:11/357,110; 2/06 PCT:IL2006/000220)

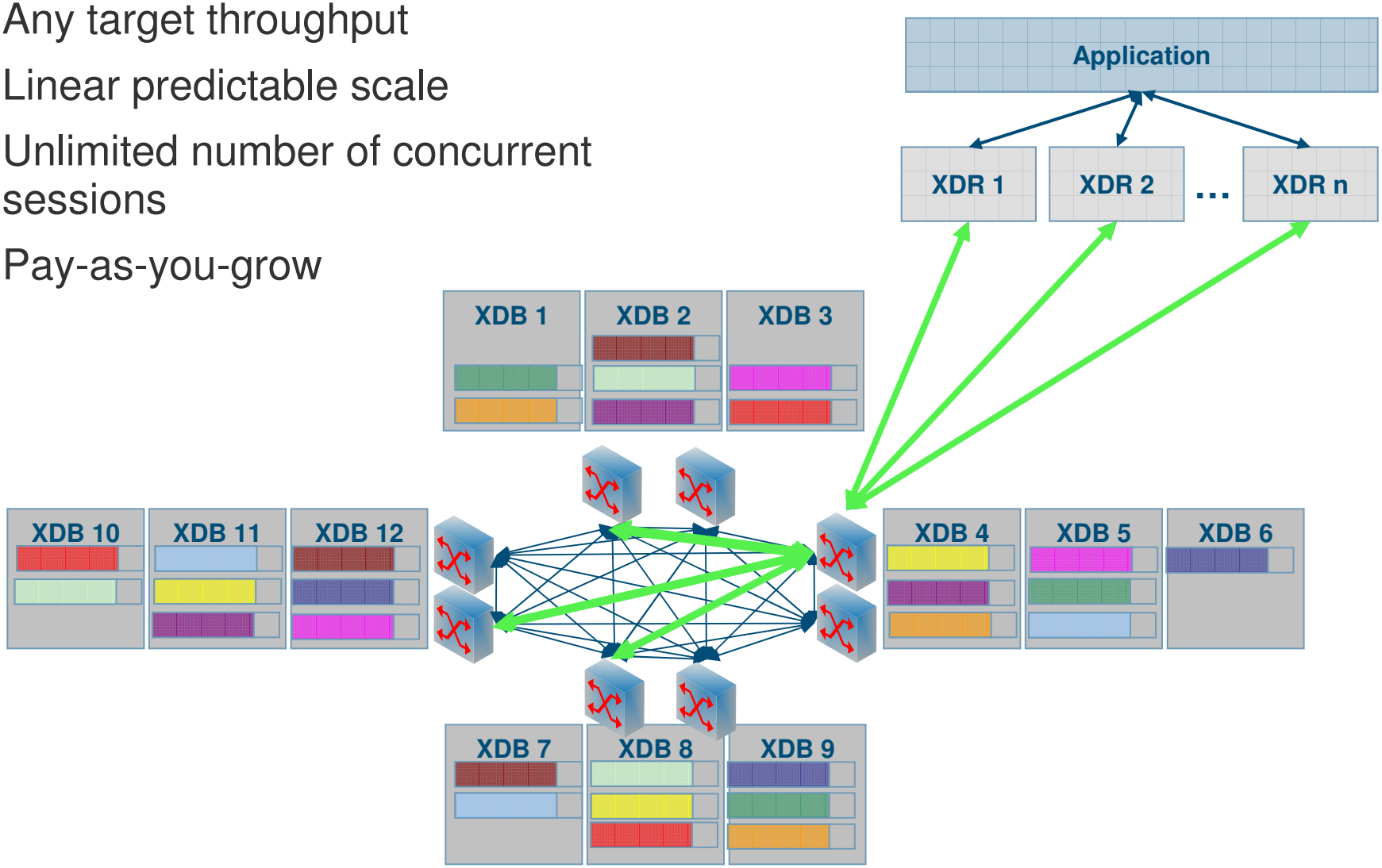
- Transparent partition virtualization by using networking address management concepts
- Distributed secondary indexes
- Majority based peer to peer distributed database algorithms
- Achieving continuous availability by leveraging IP concepts
- Active global synchronous and asynchronous cross-application and cross-location data sharing

Meeting Telco real time database needs:

- ✓ Linear and online scalability
  - subscribers, services and throughput
- ✓ Continuous availability
- ✓ Cross-location accessibility
- ✓ Real-time responsiveness
- ✓ SQL compliant transactionality

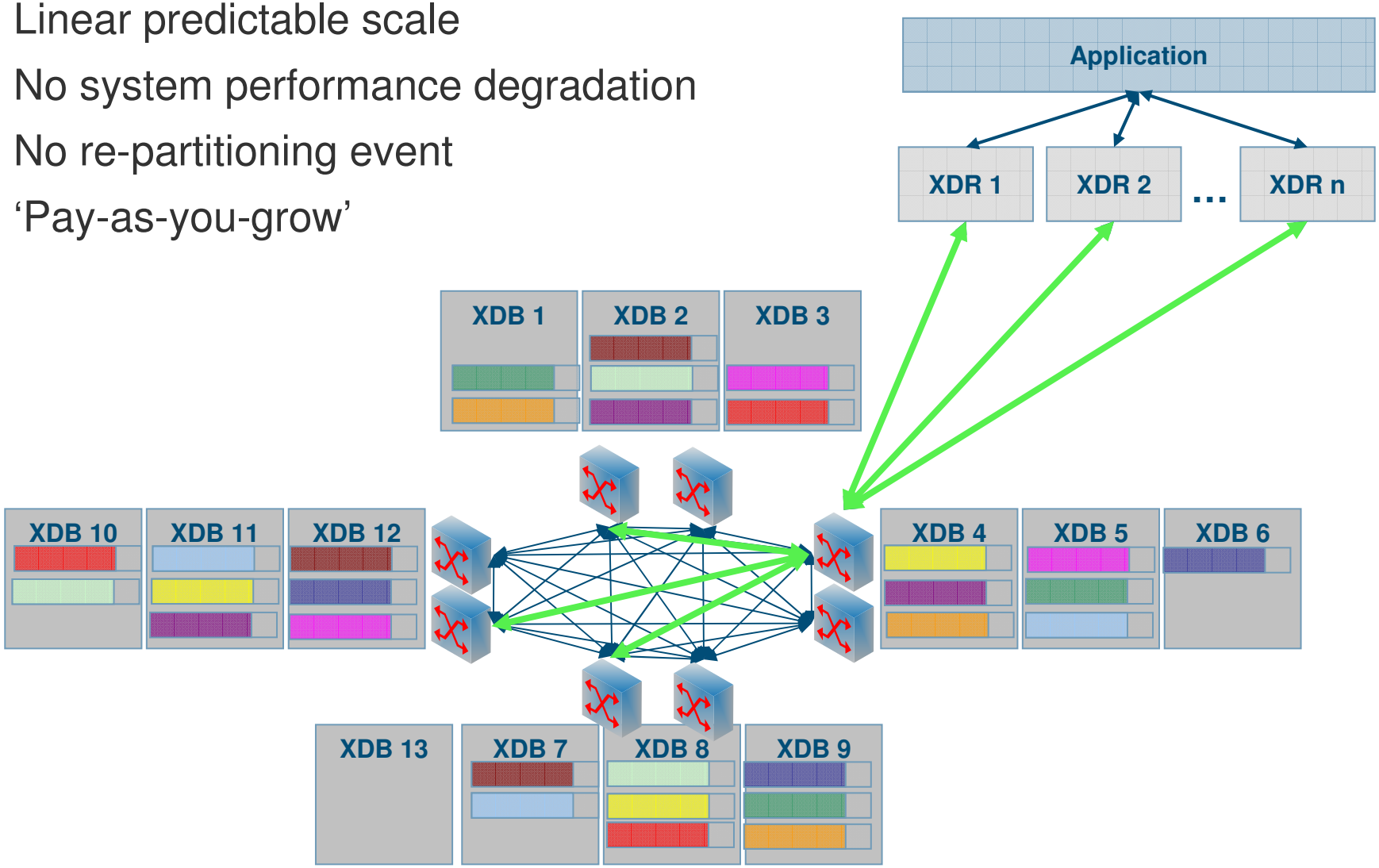
Linear Throughput Scaling

- Any target throughput
- Linear predictable scale
- Unlimited number of concurrent sessions
- Pay-as-you-grow



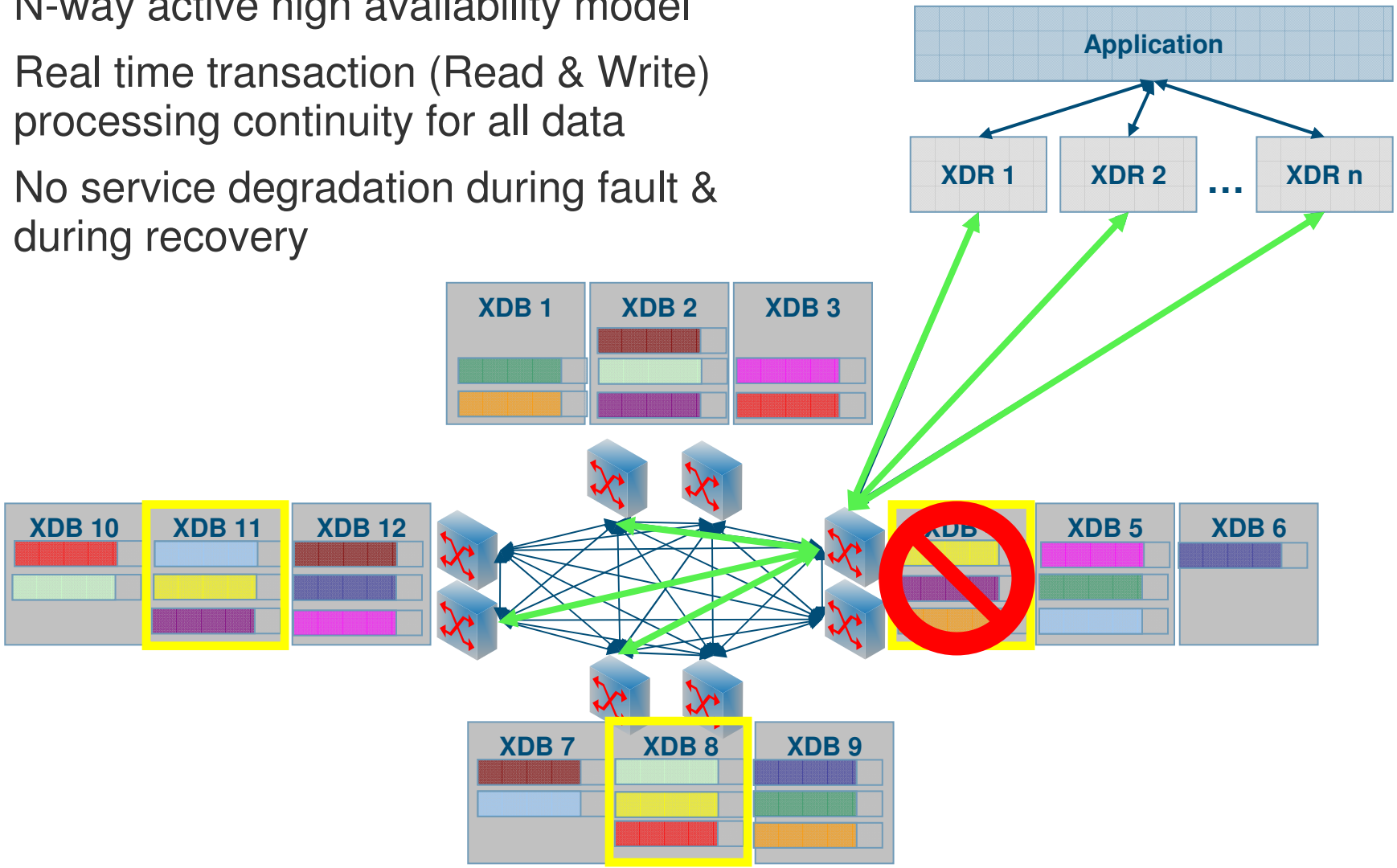
Linear Capacity Scaling

- Linear predictable scale
- No system performance degradation
- No re-partitioning event
- ‘Pay-as-you-grow’



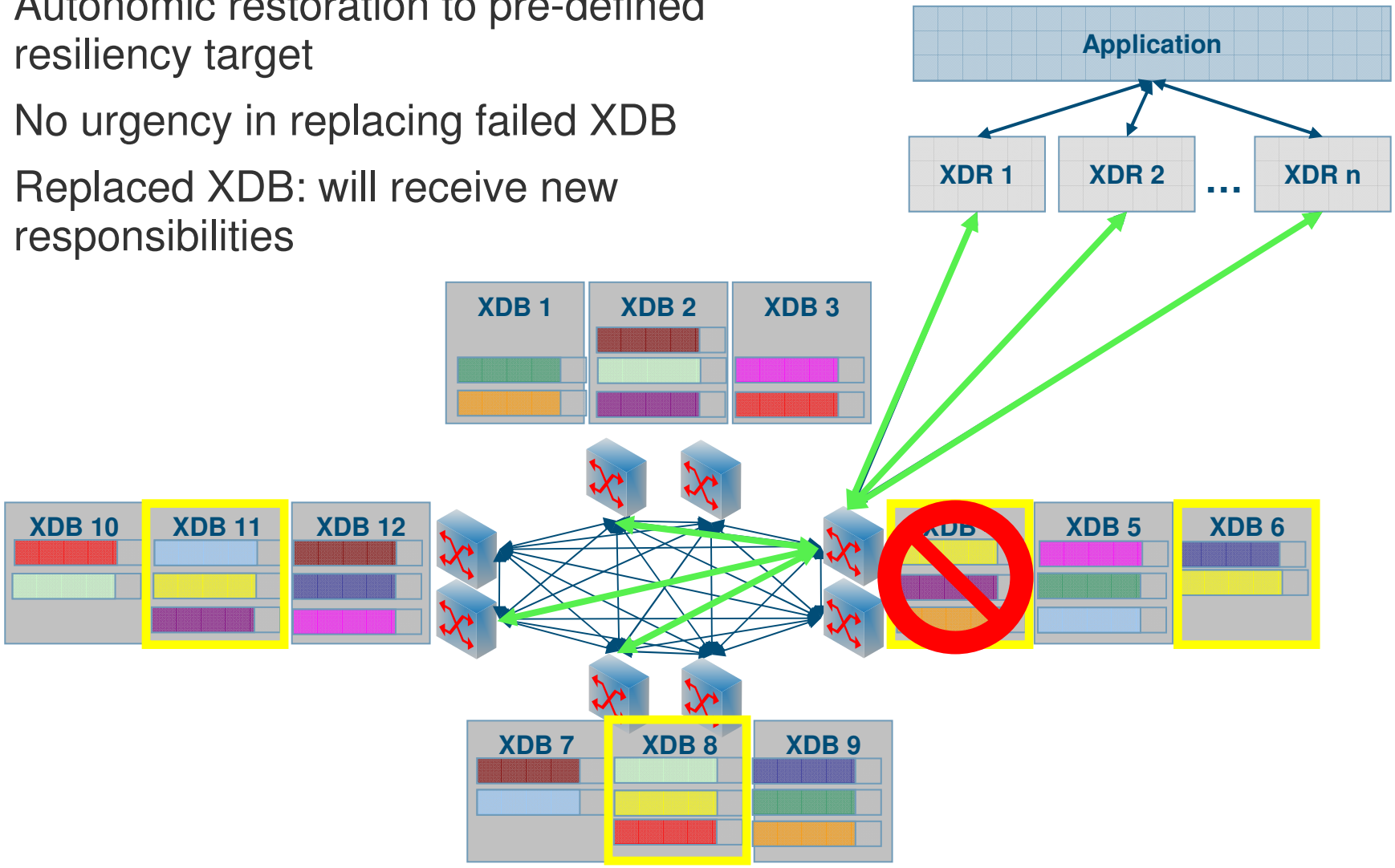
Server Failure Resiliency: XDB

- N-way active high availability model
- Real time transaction (Read & Write) processing continuity for all data
- No service degradation during fault & during recovery



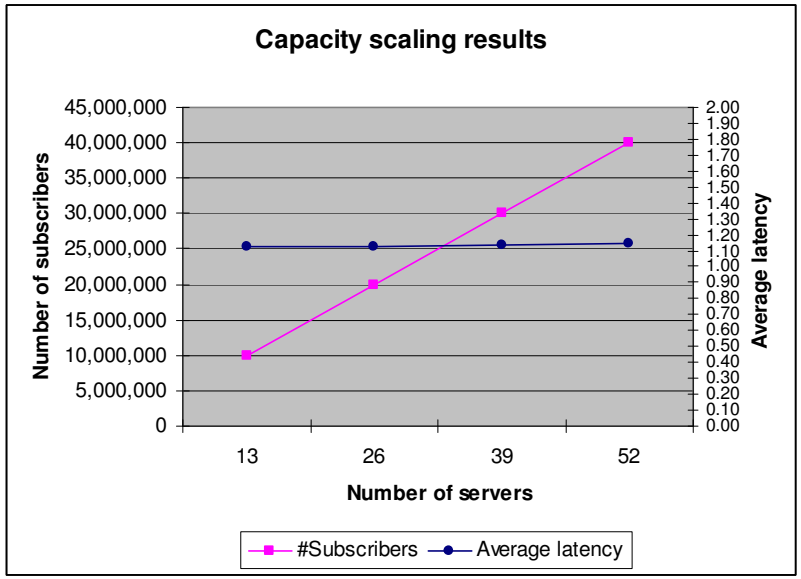
Autonomic Self-Healing

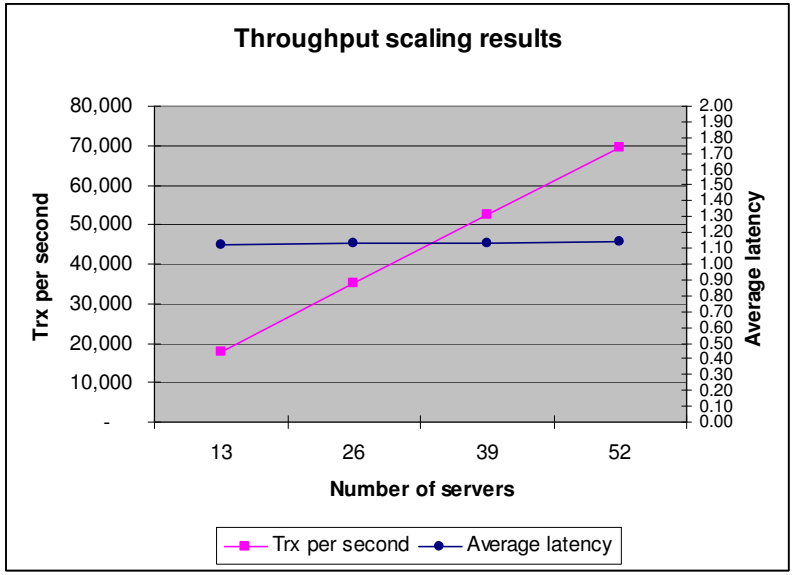
- Autonomic restoration to pre-defined resiliency target
- No urgency in replacing failed XDB
- Replaced XDB: will receive new responsibilities



Trial Results (Tier-1 US operator)

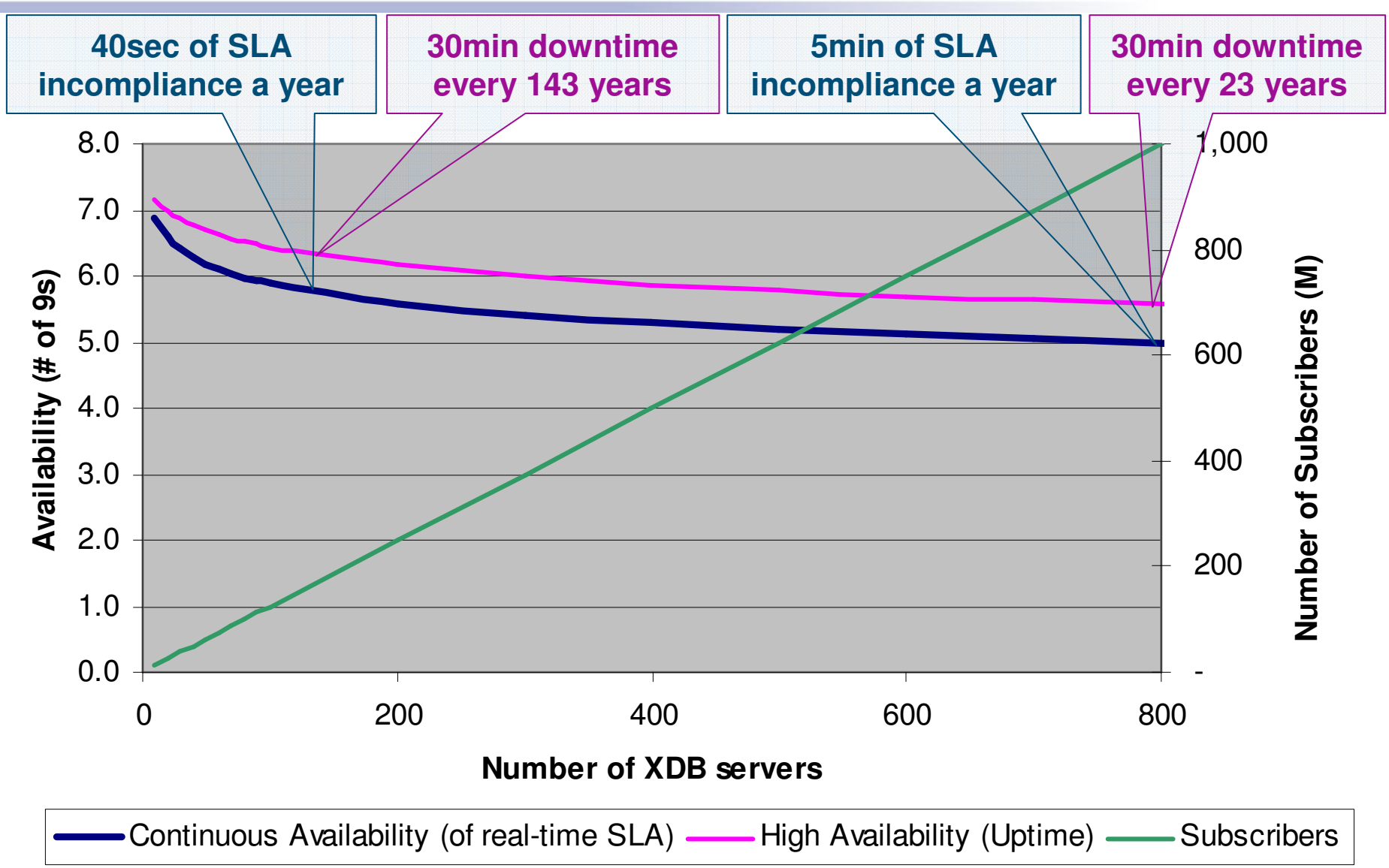
- Online **throughput** linear scaling from 10M → 40M subscribers while maintaining real-time responsiveness and latency
- **Capacity** scaling to 100M subscribers
- **Real-life transaction rates** of ~= 150M subscribers





- Tests ran on 51 IBM Blade servers that costs less than $350K
- Hardware cost is less than 0.5¢ per subscriber per service

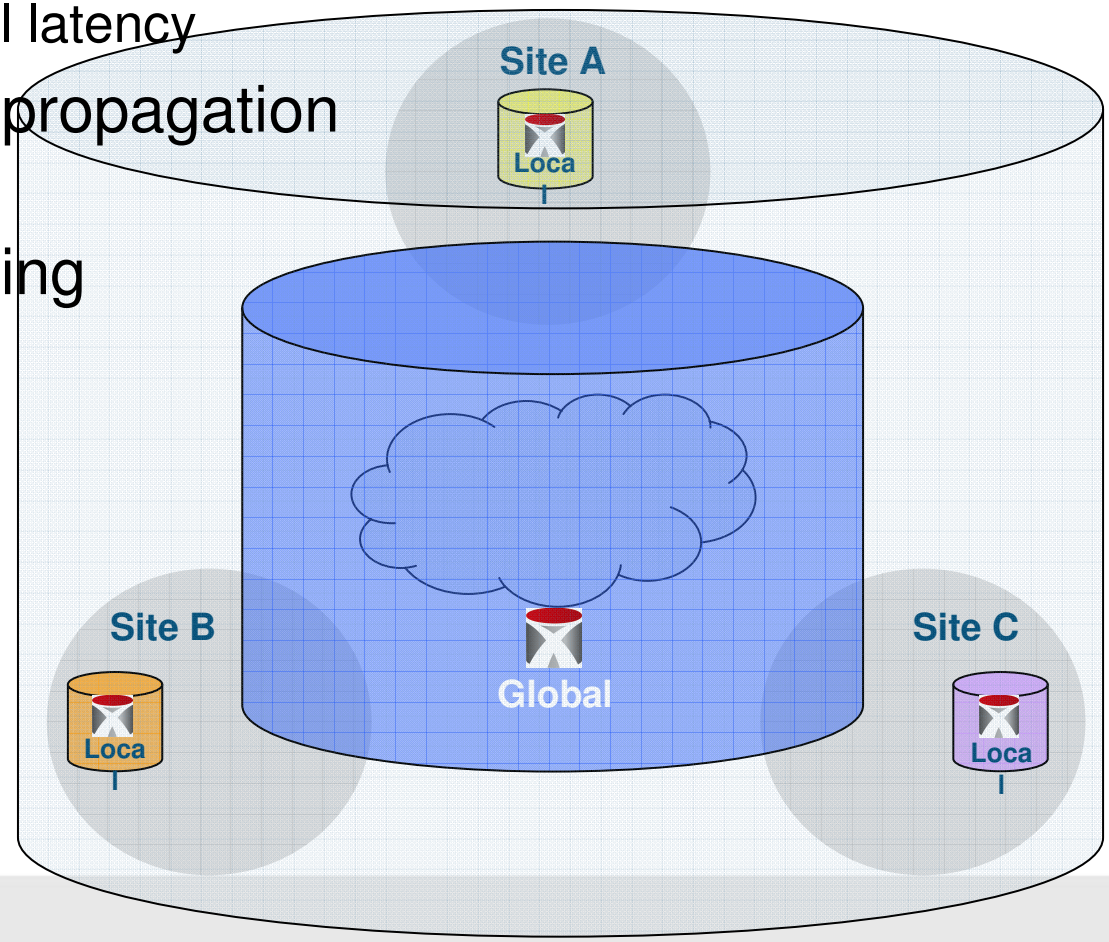
Continuous Availability of Real-time SLA



Using 3X9s (8 hours downtime a year) cluster nodes

Active Global™ Database

- Global database – Cross location data accessibility
  - Distributed between multiple of sites enabling resilience
- Local databases – Instant responsiveness
  - Enabling application local latency
- Asynchronous change propagation
  - Bi-directional
- Transparent data roaming
  - System automatically 'localizes' roaming subscribers' data



Xeround – The Telco Database Company

- Xeround leverages grid and network technologies to provides carrier grade, real-time subscriber centric database
- Xeround empowers service providers to build agile and scalable networks enabling them to win the new battleground of convergence

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