

Radical X

Facilitating Oracle® RAC Extended Distance Clusters

RAD X ENABLES

- Database clusters seamlessly extended across any distance as if they were local
- Real-time synchronization between active-active and active-standby database sites
- Backup of large amounts of data for seamless disaster recovery or devops purposes before production
- Remote access to databases resulting in substantial infrastructure reductions
- Easy integration with Oracle RAC databases and any WAN connectivity
- ~95+% WAN bandwidth utilization results in significant cost savings as bandwidth needs scale

Oracle® Real Application Cluster (RAC) databases that leverage RDMA over InfiniBand (IB) can be configured on an Extended Distance Cluster to achieve greater availability than a local implementation. The Radical X™ (RAD X) from Vcinity™ enables the Extended Distance Clusters of RAC databases by providing low-latency, high-performance connectivity across any distance.

Challenge of the Extended Oracle RAC Database Cluster

InfiniBand technology is used in high performance computing environments and provides a converged, low latency, high performance fabric aggregating storage, network, and inter-processor communication. Oracle (RAC) databases leverage RDMA over IB for its efficiency in the network stack, the CPU offload capabilities, and scalable bandwidth. A RAC database is typically located in one data center but is easily configured on an Extended Distance Cluster. This allows for seamless remote access, business continuity, and disaster recovery for databases by providing fast recovery from any failure. In case of natural or human-induced disasters, both locations must be separated geographically and the data must be replicated across locations. Replicating these very large databases over any distance poses a real challenge to the current network infrastructure.

Even though Oracle RAC Extended Distance Clusters provide better protection than local clusters, they might not protect against all types of outages. For comprehensive protection, Oracle's Maximum Availability Architecture (MAA) recommends real-time synchronization between production and active standby sites with secure backup. It is difficult to find sufficient bandwidth to do backups without impacting routine traffic. In addition, active standby sites demand real-time synchronization adding to the existing burden on the links between sites. Also, moving standby RAC database clusters to cost-effective, remote locations or remote access to databases to save on replicated infrastructure requires the IB fabric to be extended across long distances. This is not trivial! The number of IB extension products are limited and the existing products have scalability limitations in terms of WAN connectivity, reach, traffic engineering, etc. The distance barrier facing these solutions bears a high risk of losing services and limits the value of the data by trapping it within the data center.

The Vcinity Solution

Vcinity RAD X-series products extend IB fabric by using patented traffic engineering allowing for active aggregation of multiple LAN flows over the WAN. Vcinity uses hardware acceleration to extend RDMA over WAN and moves data across any distance delivering predictable performance. RAD X-series fabric extension products are based on industry-proven, deployed technology and



Source: Oracle RAC databases and MAA-related details are obtained from various sources on Oracle's website including:
<https://www.oracle.com/database/real-application-clusters/index.html>
<http://www.oracle.com/technetwork/server-storage/networking/documentation/o12-020-1653901.pdf>

provide significant enhancements to their predecessors. They support increased buffering for greater bandwidth and longer reach, scalable IB interfaces including FDR rates, integrated switching, greater density of configurable interfaces in a modular and compact form factor, and friendly WAN networking interfaces (Ethernet, IP, SONET/SDH, etc.) for easy network integration.

Vcinity's solutions enable replicating, connecting, or accessing Oracle RAC databases across any distance or location. In the deployment scenario shown in Figure 1, the RAD X-1040s are used to connect multiple sites. Sites A, B, and C can access remote RAC DB clusters at sites A and B. On the other hand, sites A and B are configured so they can be used in active-active or active-standby configurations. The RAD X-1040 enables the following Oracle RAC databases use cases on Extended Distance Clusters:

- **Real-time synchronization.** In active-active or active-standby configurations, sites A and B are

kept in sync in real-time by the deterministic, low latency connectivity provided by the RAD X-1040s. As both sites are in sync, if one of the site fails, the other site takes over seamlessly enabling near-zero Recovery Time Objective (RTO) with greatly improved Recovery Point Objective (RPO).

- **Fast back-up of large databases.** The RAD X-1040's ability to provision predictable movement of large amounts of data across any link and distance enables fast backup of large databases to any location. This backup is typically used for disaster recovery or even for cloning and devops purposes, so applications can be verified and tested before production.
- **Remote access to databases.** Additionally, extracting databases from a primary database to a remote site for auditing purposes or accessing databases (e.g., at sites A/B) remotely (from site C) also results in substantial infrastructure savings as databases do not need to be replicated.

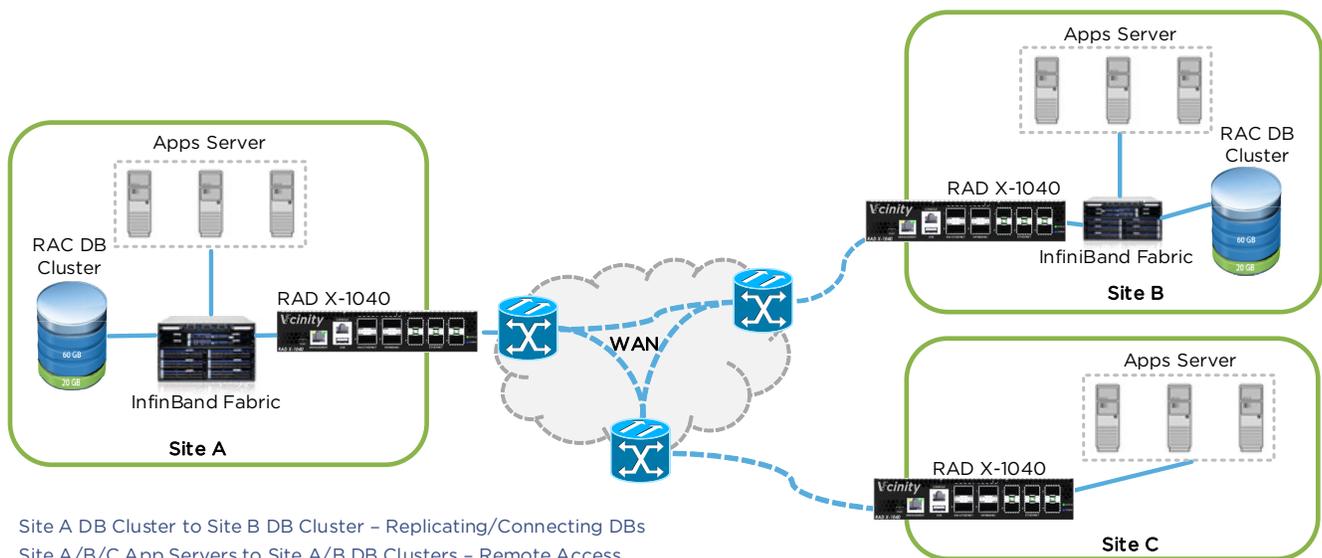


Figure 1. Oracle RAC Databases and Vcinity's RAD X-1040 Deployment Scenario