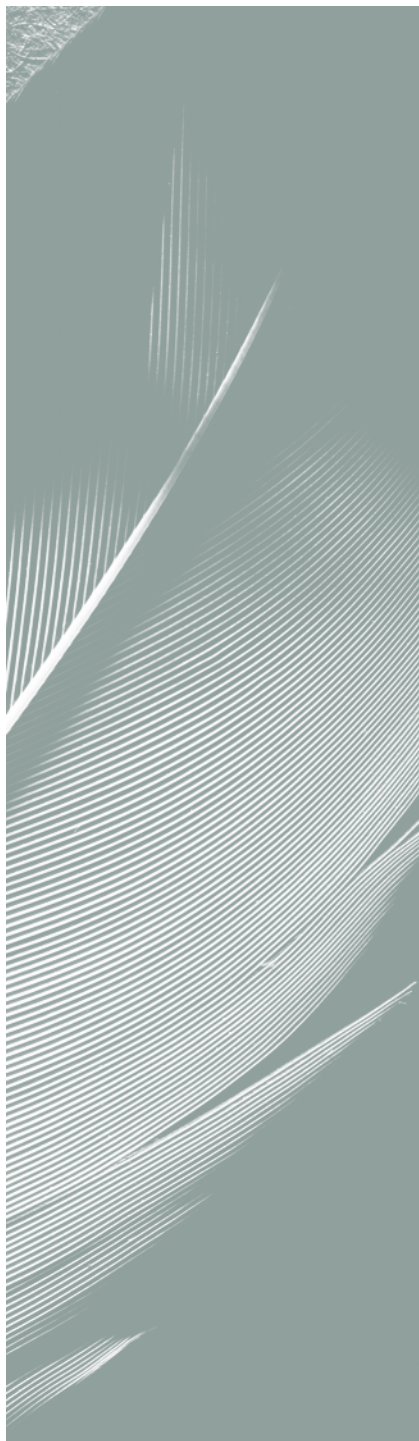




TECHNICAL BRIEF

# 3Com<sup>®</sup> XRN<sup>™</sup> Technology Brief



## XRN Overview

eXpandable Resilient Networking (XRN™) from 3Com® is a patented, innovative technology that allows network managers to build affordable networks that are highly resilient and deliver exceptional performance and flexibility. With XRN technology, multiple interconnected Gigabit switches behave as a single management switching entity, across Layer 2 and Layer 3, acting together to form what we call a **Distributed Fabric**. XRN technology was launched in 2002, supporting the formation of Distributed Fabrics across two interconnected Gigabit switches.

XRN technology is uniquely able to scale to greater capacity and performance as a network grows. The performance of an XRN Distributed Fabric scales by utilizing the forwarding capabilities of each member switch, without physical limitations normally seen in traditional centralized core chassis switches.

## XRN Technology Components

XRN Distributed Fabrics are based on the technical components illustrated in Figure 1, and outlined below.

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FIGURE 1: Relationship between XRN technology components and key technologies

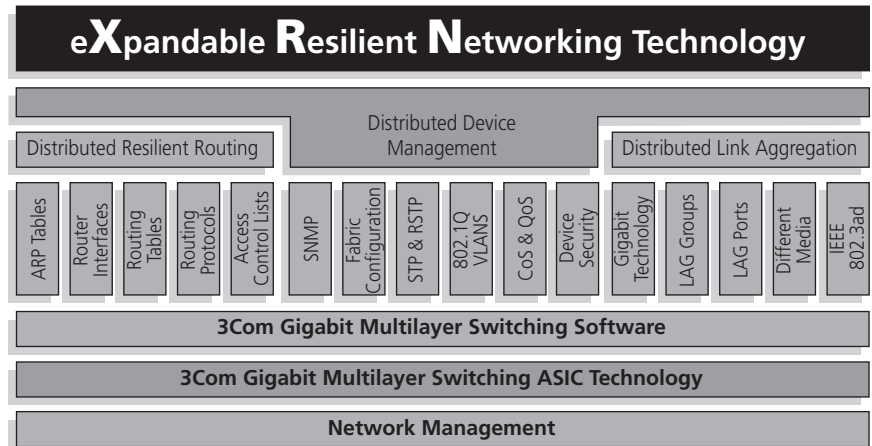
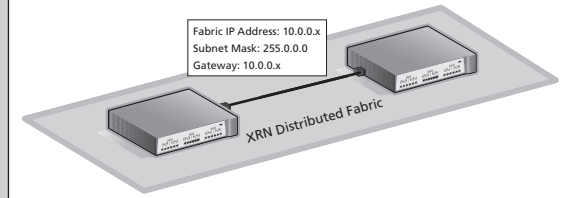


FIGURE 2: Distributed Device Management

The XRN Distributed Fabric is a single SNMP managed entity, with one IP address, one Web Interface and one Telnet Interface. All Management information is automatically distributed around the Fabric



**Distributed Device Management (DDM)**

DDM is the control system of 3Com’s XRN Technology, responsible for distributing management, configuration and control information for all switching and routing functions across the XRN Distributed Fabric (figure 2). Through DDM, the entire Distributed Fabric behaves as a single Layer 2 and Layer 3 switching and management entity, sharing configuration parameters across all member switches, and simplifying the configuration and ongoing management of the switches. Configuration synchronization across both switches is automatic once a Distributed Fabric is formed, and management is retained even if there is a failure in one of the member switches.

**Distributed Resilient Routing (DRR)**

DRR is an advanced routing implementation that allows multiple interconnected switches in an XRN Distributed Fabric to behave as a single active routing entity. Unlike traditional approaches to Layer 3 redundancy such as VRRP or HSRP, DRR intelligently distributes routing information such as interfaces, routing protocol processing and routing tables across all switches in the Distributed Fabric (figure 3). Through DRR each member switch has the ability to route packets locally, thereby sharing the routing burden across all switches in the fabric, maximizing routing performance and making full use of the available switching capacity.

FIGURE 3: Distributed Resilient Routing

The XRN Distributed Fabric behaves as a single router with multiple, active routing engines

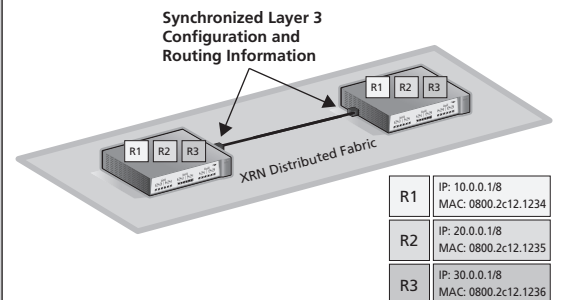
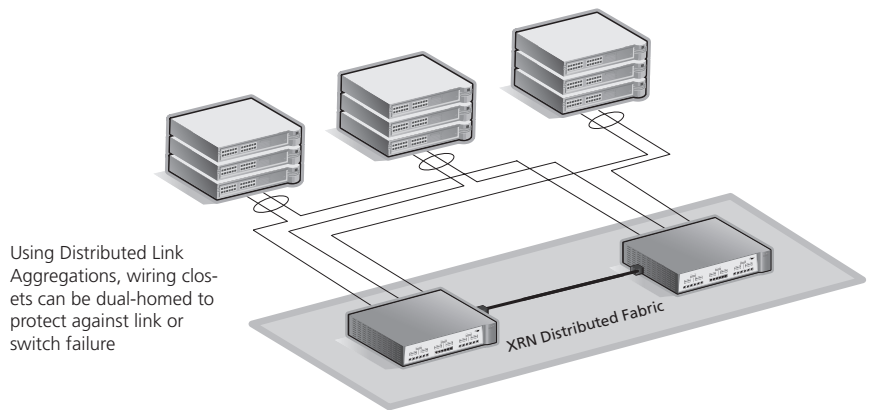


FIGURE 4: Distributed Link Aggregation



### Distributed Link Aggregation (DLA)

The DLA implementation in XRN Technology enables edge devices to be multi-homed across the switches in the Distributed Fabric, providing both high availability and performance (figure 4).

DLA supports standards-based IEEE 802.3ad Link Aggregation, so that any device supporting the standard can be connected to an XRN Distributed Fabric and immediately benefit from the performance and resiliency of XRN Technology. DLA also supports Intelligent Local Forwarding to ensure that traffic coming in and out of the Distributed Fabric retains an optimal path rather than going through the XRN interconnect.

### Standards based support

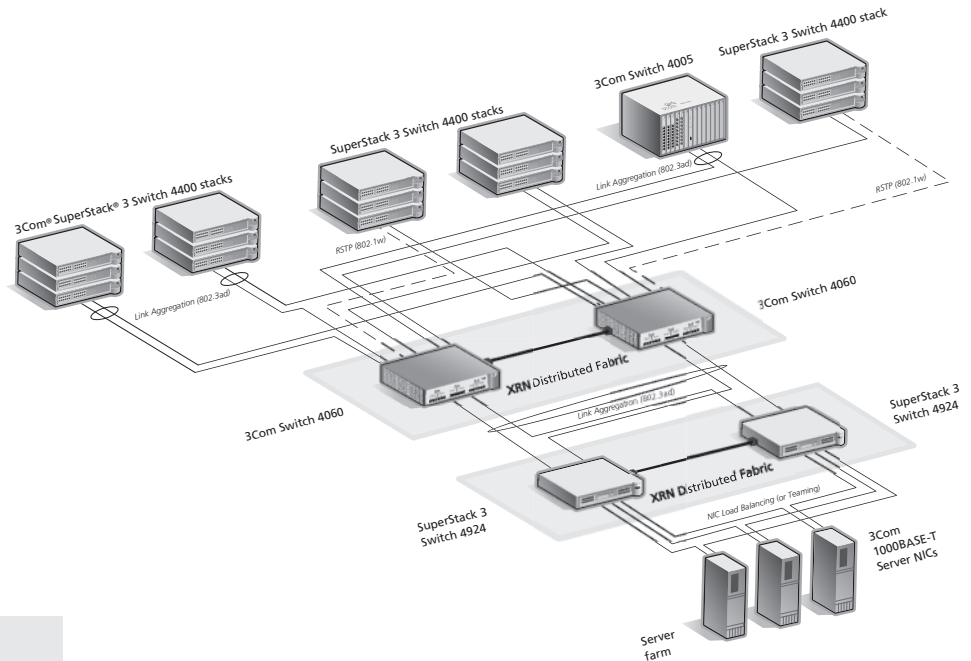
Even though XRN Technology was created and is patented by 3Com, strong adherence to standards allows customers to deploy XRN Distributed Fabrics in any multi-vendor network infrastructure. An XRN Distributed Fabric supports standard management protocols like SNMP and RMON, standard Layer 2 services like 802.1D, 802.1w and 802.3ad LACP for link aggregation. Because an XRN Distributed Fabric does not use any proprietary protocols to communicate with devices attached to it, any switch that

supports either Link Aggregation or Spanning Tree can connect to a Distributed Fabric and take advantage of DLA or the resiliency capabilities of XRN technology. From a routing perspective, DRR supports standards-based routing protocols such as RIP, RIP2 and OSPF enabling the Distributed Fabric to participate in any routed inter-network using these protocols.

### XRN Product Support Today

XRN Technology currently is available for the 3Com SuperStack 3 Switch 4900 family for workgroup and server farm applications, and the 3Com Switch 40x0 family for Enterprise campus applications (figure 5). The current XRN-enabled products support the formation of a Distributed Fabric of two interconnected units. Fabric interconnects can be formed using the XRN Interconnect Module and Cable or the GBIC Fabric Interconnect option. The GBIC Fabric Interconnect kit enables the deployment of geographically distributed XRN Fabrics through the support of standard GBIC interfaces on the 3Com 4-port GBIC Expansion module. This allows Distributed Fabrics to be extended up to 70km apart, allowing a core XRN distributed fabric to be created across separate building for greater availability.

FIGURE 5: XRN Phase One



## Product Overview

The 3Com XRN Interconnect Kit includes two XRN modules, a 1 meter cable (an optional 5m cable is also available), and version 3.0 of the 3Com Gigabit Multilayer Switching Software.

When installed, it provides a high-performance 8Gbps connection which enables configuration and management of the Distributed Fabric as single switching entity. If one switch in the Fabric fails, management and Layer 2 and Layer 3 switching are automatically restored on the remaining switch.

In the unlikely event of a failure in an XRN interconnect module or cable, DLA continues to provide an active path allowing the switches to communicate, and DRR ensures that only one of the switches continues to route—eliminating the possibility of duplicate routers on the network.

XRN technology can be deployed at all areas of an enterprise network: at the core backbone with the 3Com Switch 4060 and Switch 4050; the server farm with a SuperStack 3 Switch 4924; in the wiring closet using the SuperStack 3 Switch 4900 and 4900SX as Gigabit aggregation switches.



## XRN Roadmap

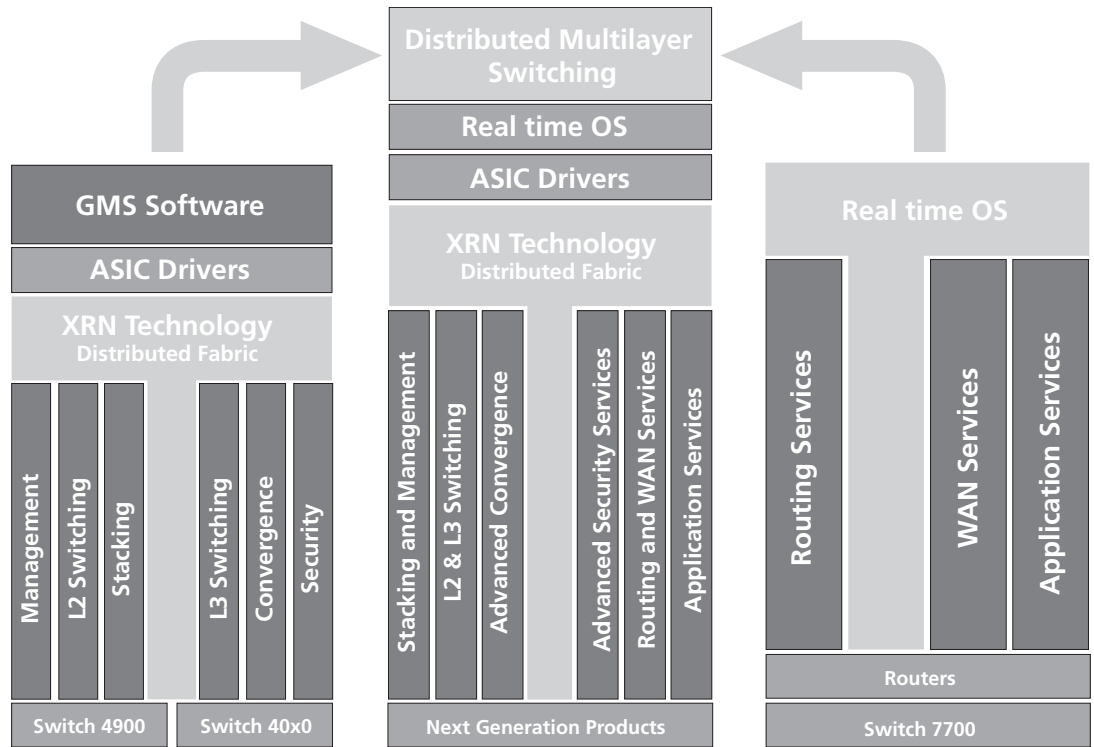
The establishment of the Huawei-3Com Joint Venture will lead to a single platform-independent codebase integrating reliability, security and convergence support with ease of management. The best of 3Com and Huawei technology will be combined. Taking the proven Huawei VRP modular and router codebase, and the innovative 3Com XRN technology, the Huawei-3Com Distributed Multilayer Switching (DMS) software will combine the highly functional services inherent in VRP and the resilience and high-availability of XRN (see figure 6).

In the future, 3Com switch families will be able to support distributed fabrics of up to four interconnected devices, and ultimately distributed fabrics of up to eight interconnected devices, for unparalleled levels of performance and availability. Architectural work and specifications to accomplish this is complete, and work is underway at Huawei-3Com to integrate the technology into the Distributed Multilayer Switching code base, with an expected delivery on next generation products in 2005.

For greater levels of flexibility, future XRN-enabled products will support a variety of form factor and applications, extending the attributes of XRN beyond the Gigabit core. This will enable 3Com to deliver next generation convergence-ready network solutions that encompass high performance Gigabit and 10 Gigabit switching technologies, highly scalable network telephony applications, and ironclad security all under a totally integrated management infrastructure. It will enable the deployment of XRN-aware network solutions that deliver scalable performance, high levels of fault tolerance, and adaptability to changing requirements. With everything from desktop switches to router products sharing common functionality and a common user experience, this will result in reduced training overhead and simplified configuration and on-going maintenance, thereby delivering the lowest possible Total Cost of Ownership (TCO) for networking technology.

For a more detailed explanation of XRN Technology please see [http://www.3com.com/other/pdfs/infra/corpinf/en\\_US/xrn\\_wp.pdf](http://www.3com.com/other/pdfs/infra/corpinf/en_US/xrn_wp.pdf).

FIGURE 6: Codebase integration picture



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