Technology Article

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FT/HA and DFT/HA

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Now more than ever, today's telecommunication platforms must be robust enough to provide "five nines" (99.999%) of availability. A critical component in telecom operations, five nines means that a user is insured practically no loss of service due to hardware or software errors, or any downtime for software upgrades or hardware maintenance. Alongside the stringent requirements demanded by this extreme high availability, network infrastructure must also be scalable enough to accommodate rapid customer growth. Furthermore, these standards of performance are expected in both circuit- and packet-based networks, thereby raising the competitive bar for everyone. All of these forces place unprecedented burdens on providers to ensure that every network element needed to support a service is functioning whenever a user requests it. "Always on" has come to embody a very literal meaning in the networking world.

Telecom infrastructure solutions from Radisys relieve this pressure and make network design and deployment much more manageable. The company's Trillium software product line delivers innovative protocol software solutions for Fault-Tolerant/High-Availability (FT/HA) and Distributed Fault-Tolerant/High-Availability (DFT/HA). From Voice over IP (VoIP), to IP Multimedia Subsystem (IMS), to 3G and Long Term Evolution, Radisys offers a wide range of Trillium solutions ready for platform integration and deployment.

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Trillium Fault-Tolerance

Trillium protocol stack software from Radisys offers powerful options for FT/HA and patented DFT/HA architectures and implementations. Trillium FT/HA software solutions are based on active/standby configurations to achieve redundancy. Providing a flexible, platform-independent, cost-effective framework that maintains active connectivity during software and hardware failures, Radisys software architecture solutions are modular, allowing telecom equipment manufacturers to add components as their customers' needs evolve. Furthermore, the widely deployed Trillium solutions give system designers and engineers total freedom when choosing their hardware platform and operating system.

Besides high availability, telecom equipment manufacturers also need to meet the scalability required to support converging networks. Trillium's DFT/HA solutions meet these challenges in several ways. For example, the core software functionality allows the creation and management of Distributed Fault-Tolerant applications, Pure Distributed applications, and Pure Fault-Tolerant applications. Trillium products achieve this mix of performance, scalability, and availability by distributing the processing load across multiple processors. At the same time, DFT/HA software allows the coexistence of distributed and non-distributed protocol layers.

In simple terms, Trillium DFT/HA solutions enable system designers and engineers to replicate a node and turn those nodes into a (D)FT/HA system. In particular, Trillium core software:

- Distributes the protocol load onto available physical processors,
- Dynamically re-distributes load upon processor failure and new processor introduction,
- Retains active calls and recovers from processor failures, and
- Allows maintenance operations to be performed without bringing the system down.

Sample Solution: FT/HA and DFT/HA for an HLR

An FT/HA open service platform can be used for a Home Location Register (HLR), which accesses database information for wireless user profiles and features. Trillium's FT/HA Transaction Capabilities Application Part (TCAP) stack within the HLR enables the standby subsystem to maintain state information through state updates from the active subsystem. These updates prevent the loss of state information, enabling an orderly automatic or manual switchover procedure from the failed subsystem to the standby subsystem.

Likewise, network element designers can use the Trillium DFT/HA TCAP stack to create an active/standby, dual-node architecture as well as a scalable, multi-node architecture, which allows for the number of active and standby nodes to be configured and for the active nodes to share the system load.

In this way, different processors can be active and standby for each other, providing an N+M configuration in addition to 2N and N+1. For other system types — such as a Signaling Gateway (SG) — the multi-node approach using the Trillium DFT/HA software solution can provide the high level of availability required for carrier-grade deployments.

Your Product...Your Application...Your Reputation

Radisys' portable software approach widens the choices for hardware platforms and operating systems and supports easy integration of applications and protocols. Ultimately, that means that telecom equipment manufacturers can focus their limited resources on adding proprietary value to the application layer to differentiate product offerings and stay competitive, while Trillium software provides the FT/HA communication layers that give service to a system user and maintain active calls during software and hardware failures.

The patented Trillium DFT/HA software architecture builds on the strengths of the FT/HA solution while enabling next-generation network performance and scalability by distributing a protocol layer across multiple processors while maintaining fault tolerance. Designed to enable a smooth migration path, it is a high quality, carrier-class solution that fulfills the requirements of converged networks.

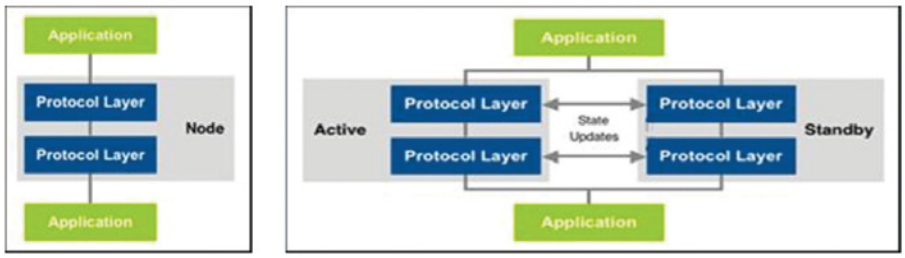

Figure 1 and 2. *Conventional Layer and Fault-Tolerant/High-Availability (FT/HA) Architecture*

Advantages to licensing Trillium FT/HA and DFT/HA solutions

- High-performance software technology, which is targeted at all types of carrier-grade network infrastructure equipment for VoIP, wireless and IMS applications
- Trillium Advanced Portability Architecture (TAPA) and source code solutions, which expand hardware/software platform options to reduce risk and time-to-market
- Small footprint and dynamic memory for optimized solutions, which reduces costs
- A broad technology roadmap, which provides flexibility, scalability, and long-term return on investment

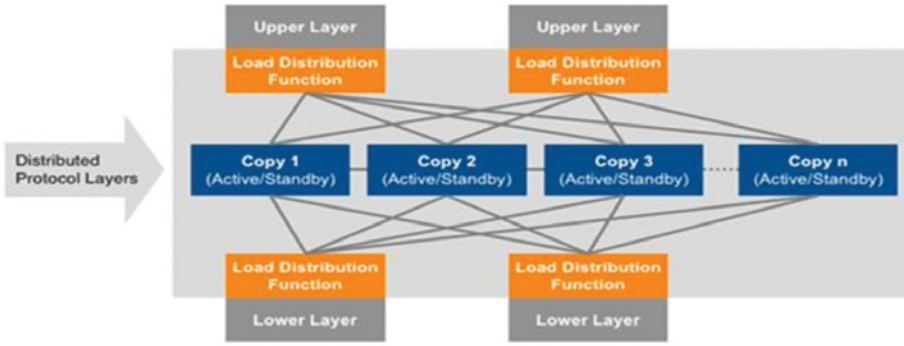

Figure 3. *Distributed Fault-Tolerant/High-Availability (DFT/HA) Architecture*

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