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OpenSAF™ The Open Service Availability Framework

Using OpenSAF™ Middleware To Create Highly Available Systems

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EMERSON Network Power

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OpenSAF™ The Open Service Availability Framework

OpenSAF™

- **Well-structured Open Source Project**
  - **Robust, standards-based, field-proven high availability middleware project**
  - **LGPL v2.1 open source licensing**
  - **Founded with an initial Emerson contribution of 650,000+ lines of code**
  - **Active contributors from major companies that work in varying sectors of the ecosystem**
- **OpenSAF Foundation**
  - **Legal guidance and protection**
  - **Financial support**
  - **Marketing and branding**
  - **Road-mapping and planning**

No vendor lock-in

www.opensaf.org

OpenSAF™ Goals

- **Accelerate the development and adoption of open specification base platform middleware**
  - **Expand the open source implementation of base platform middleware**
  - **Aligned with SA Forum specifications**
  - **Extend capabilities necessary to deploy and manage the software**
  - **Publicize the adoption of OpenSAF**
  - **Initially focus on communications market and extend to other industries**
  - **Application developers and ISVs adopt OpenSAF as the defacto implementation**

Leverage Collective Industry Expertise

OpenSAF™ Momentum

Rancore Technologies

- **Foundation Members**
  - **Telecom**
  - **Enterprise computing**
  - **Software and embedded**
- **Project Participation**
  - **40+ core development community, 1000+ on active mailing lists**
  - **Hundreds of code downloads across the globe**
  - **200+ contributions from dozens of people in 2008**
  - **1 major release (Rel 2.0) in 2008 with multiple contributors**
  - **Release 3.0 with significant enhancements May/June 2009**
- **Over 100,000 hrs continuous operation in Telecom networks**
- **Commercial distribution available**

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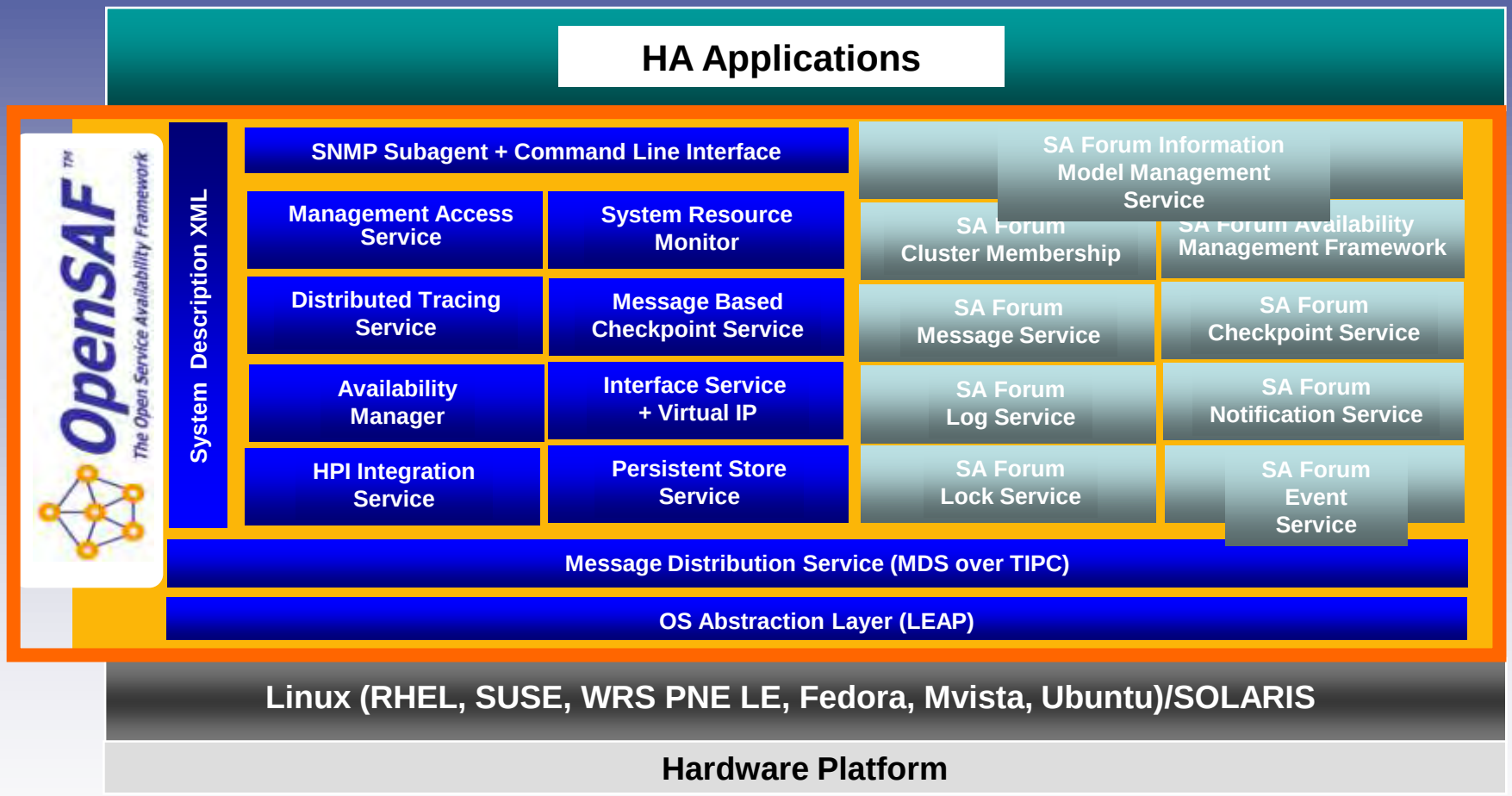
OpenSAF™ Key Features



Comprehensive and Evolving Solution in Open Source

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Building A 5+ NINES System

- A complete solution requires
  - A powerful HA framework
  - Comprehensive system & upgrade management
  - State Data Replication mechanisms
  - Logging, Tracing & Debugging
  - IP failover capabilities
  - High Performance Messaging & Load Sharing
  - Platform Integration & Tuning

OpenSAF™ Features That Enable Building A 5 NINES System

- ***High Availability Services***
  - ***Availability Management Framework***
  - ***Cluster Membership Service***

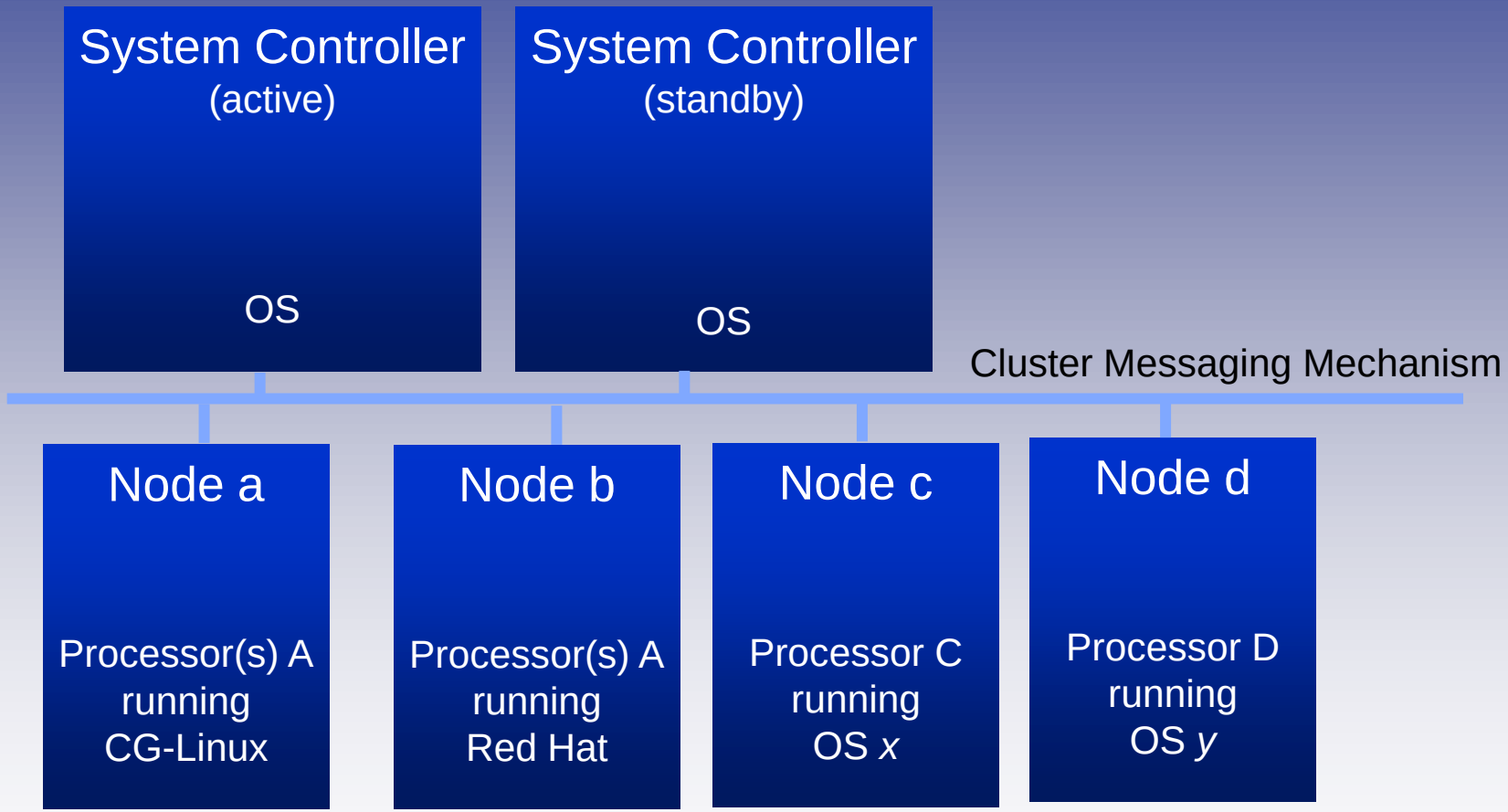
Architectural Focus

- ***System Management Services***
  - ***SAF IMM A.02***
  - ***SAF NTF A.01***
  - ***SAF LOG A.01***
  - ***Management Access Service***
  - ***Persistent Store Service***
  - ***SNMP Sub-Agent + CLI***
  - ***Distributed Trace Service***

- ***Application/Interface Services***
  - ***Checkpoint Service***
  - ***Message Queue Service***
  - ***Event Distribution Service***
  - ***Message Based Check-pointing Service***
  - ***Interface Service***
  - ***Distributed Lock Service***

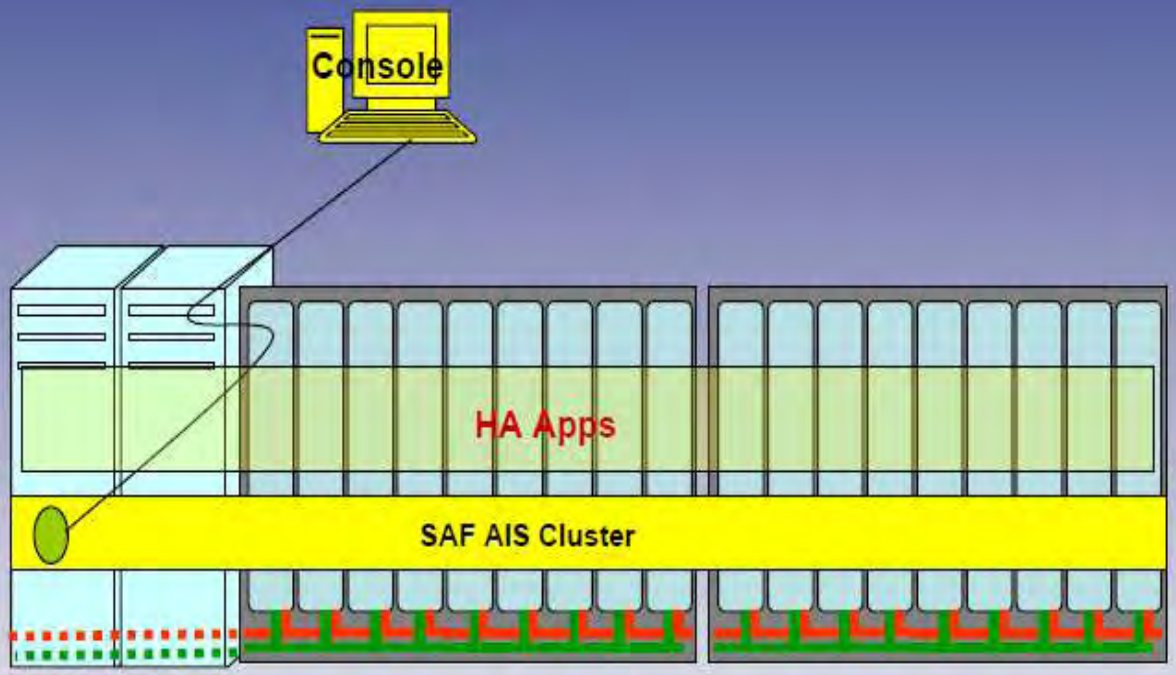
- ***Platform + OS Services***
  - ***MONC***
  - ***DRBD***
  - ***Platform Adaptation Interface***
  - ***Target Platform Services***

Cluster and Node Organization



Architecturally Aligned With AdvancedTCA (and other COTS blade systems)

SAF/OpenSAF™ Cluster –



- **A cluster** is typically made up of resources in a chassis. Multiple chassis solutions are typically located in the same rack.

Typical AdvancedTCA Use Model

- Internal control
  - Dual star base fabric
    - Data fabric used for customer/application data
  - Reliable transport mechanisms
    - TIPC and MDS over base fabric
- Virtual IP addressing for application redundancy mapping
  - Transparency for application when switching from active to redundant blades
- HPI integration
  - Hardware events integrated into overall availability model
    - OpenSAF development based on OpenHPI
- Overall system model description (and failover)
  - SA Forum Availability Management Framework (AMF)
  - Bill Of Materials (BOM) description
  - Role Determination Entity (RDE) – active/standby/fail status

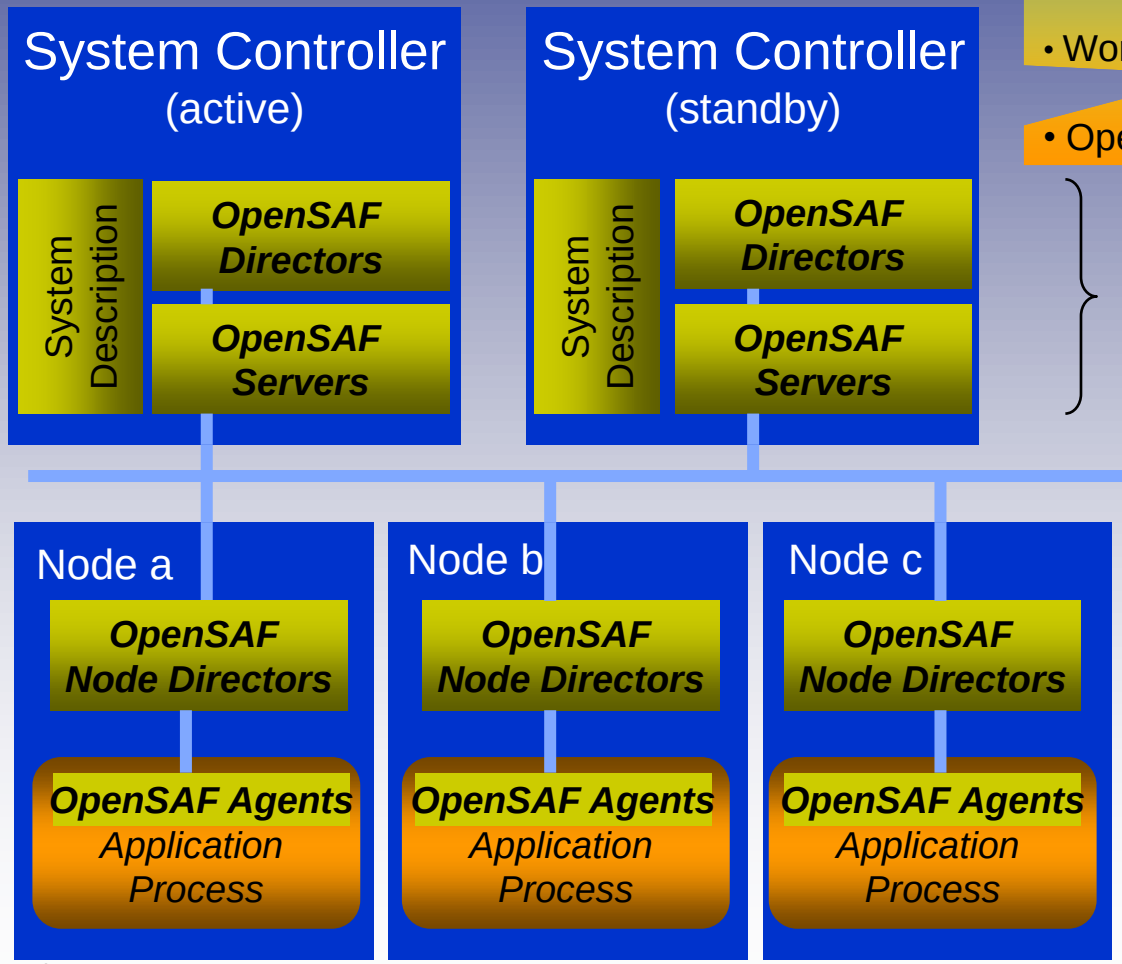
OpenSAF™ Deployment View

- OpenSAF™ cluster consists of two node types:
  - System Controller Node:
    Hosts: Centralized functions of various OpenSAF services, management access point. Application components may be configured on a system controller node. System controller node is made 2N redundant.
  - Payload Node
    Hosts: All nodes which are not system controller nodes are termed payload nodes. These nodes contain node-scoped functions of various OpenSAF services. They are expected to host the target OpenSAF application components.

3/2-Tier OpenSAF™ Architecture

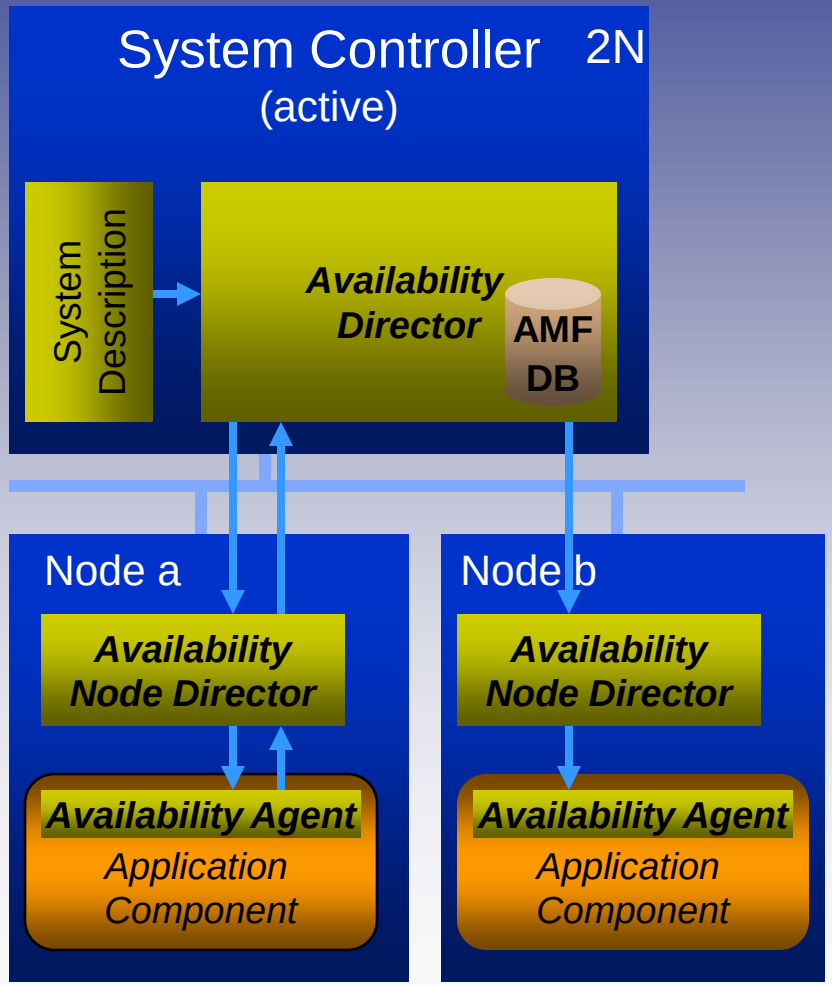
Node and System Control

- Directors/servers have cluster wide view
- Work in conjunction with node directors
- OpenSAF configuration is stored here



- **Node directors process all events that can be managed at node scope**

AMF Design



- **The Availability Director reads configuration from System Description**
- **The Availability Director passes on the node related configuration to the node directors.**
- **The node directors manage the life-cycle and health check or the application components.**
- **Faults in application are detected by node director and passed on to the director if a failover is needed.**
- **The Availability Director orchestrates the failover by sending commands in a sequence to node directors.**

Key OpenSAF™ Architectural Tenets

- ***Highly Modular***
  - Selectively turn features ON/OFF
  - Use only the features that you need without starting all services
- ***Distributed & Highly Available***
  - Distributed to localize faults close to the source
  - Highly Available by itself
- ***Portable***
  - Highly Portable across various OS & Hardware combinations.
- ***Re-use Everywhere***
  - OpenSAF itself uses AMF for its own HA
  - OpenSAF services use message based checkpointing for their own check-pointing needs
    - Superior performance over SA Forum MSG service
  - They all use MDS for messaging

OpenSAF™ Future – Release 4.0

Release

Feature complete – Q4 2009

General availability – Q1 2010

Feature Description/Availability

SA Forum Software Management Framework - SAI-AIS-SMF-A.01.01	4.0
SAI-AIS-AMF-B.03.01 (subset) to enable SA Forum software management	4.0
SA Forum Platform Layer Management - SAI-AIS-PLM-A.01.01	4.0
IMM-AMF integration (AMF Object Implementer support)	4.0
Replace OpenSAF EDSv events with SA Forum NTF	4.0
MDS over alternate transport	4.0
OpenSAF Solaris port	earlier than 4.0

Major contributions from Emerson, Ericsson, Wind River, HP, SUN (via Calsoft), other community members
Testing by other Foundation members

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Thank You

For more information pleas visit www.saforum.org

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