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OpenSAF
The Open Service Availability Framework

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Changes to AMF in OpenSAF 4.0

Hans Feldt
Senior Software Engineer, Ericsson AB
Hans.Feldt@ericsson.com

Developer Days May 2010

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Presentation outline

- AMF introduction
- AMF changes B.01 to B.04
- OpenSAF AMF changes 3.0 to 4.0
- AMF Demonstration

AMF - what does Wikipedia say:

* Action Message Format, a protocol for object remoting
* Afghan Militia Force, as designated by various U.S. government agencies
* Alphamethylfentanyl, one of the first widely distributed designer drugs, responsible for the implementation of the U. S. Analog Act.
* American Machine and Foundry, a recreational equipment supplier
* Ameriflight, an airline with ICAO code AMF
* Ama Airport in Ama, Papua New Guinea, from its International Air Transport Association airport code
* AMF Bowling Center
* AMF Pension AB, a Swedish financial company
* Ammanford railway station, from its National Rail code
* Arab Monetary Fund
* Asociación Mundial de Fútbol de Salón (World Futsal Association), an international futsal governing body
* Atlantic Music Festival, an international music festival in the United States
* Attacking midfielder, in Association Football.
* Australian Military Forces, forerunner to the Australian Army Reserve
* Autorité des marchés financiers (France), French financial regulatory agency
* Autorité des marchés financiers (Québec), Canadian state of Quebec financial regulatory agency
* Automatic Mains Failure
* In Russian 'Aviatsiya Voenno-Morskogo Flota', literally "aviation of the military maritime fleet", the air-arm of the Soviet Navy from 1918 to 1991.

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Availability Management Framework

- “Distributed init on steroids”
- SA-Forum defined service
- A defined Information Model
- Controls Life Cycle of Components (start/stop)
- Monitors health of components (restart)
- Support to separate a program and its *workload*
- Workload assigned an HA state (active, standby, ...)
- Administrative operations on objects in the model
- Alarms and notifications

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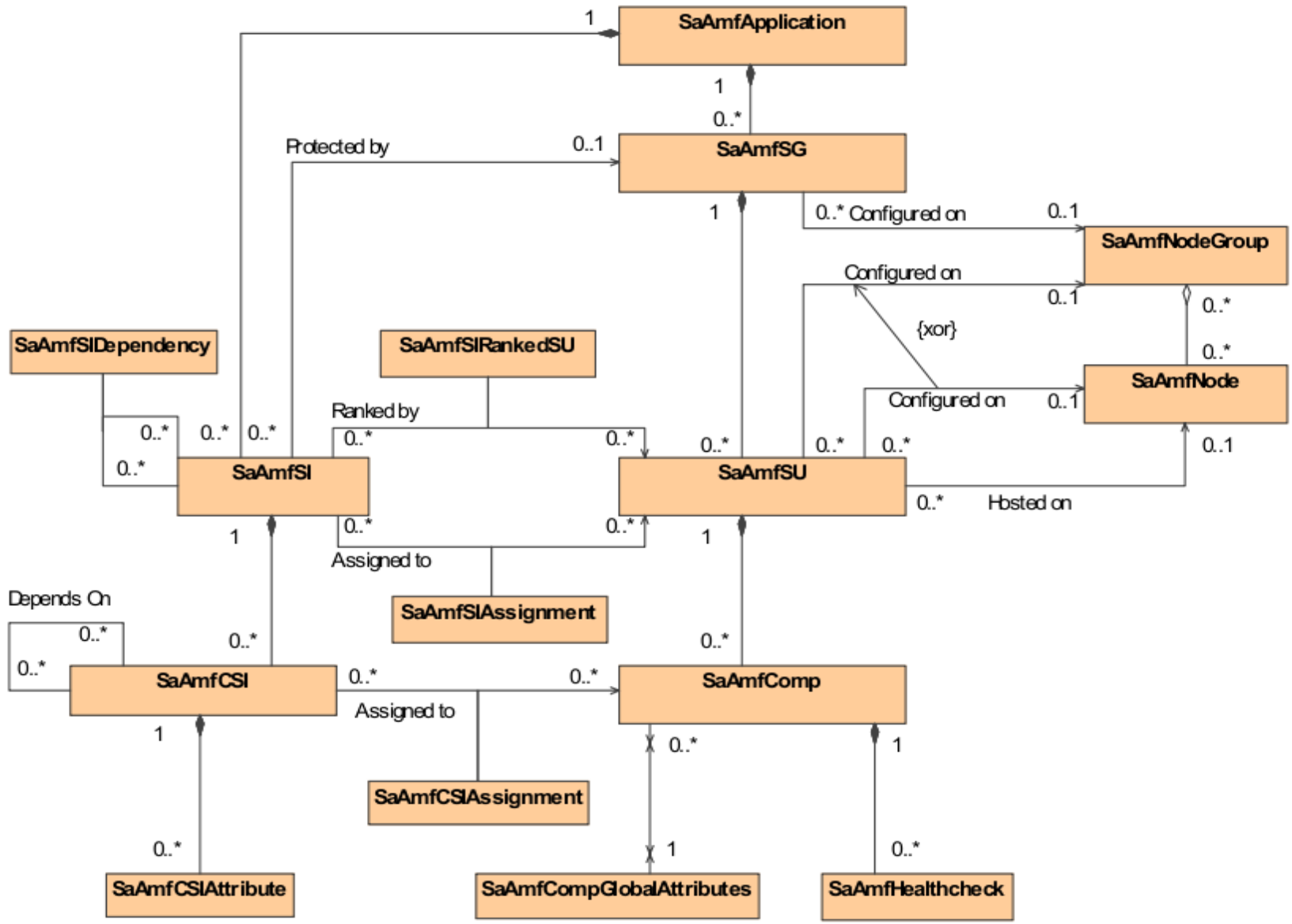
AMF changes B.01 to B.04

- Information Model clearly defined using UML
- Alarms & Notifications defined
- Administrative operations defined
- Container/contained concept
- Types
- Node groups
- C API changes

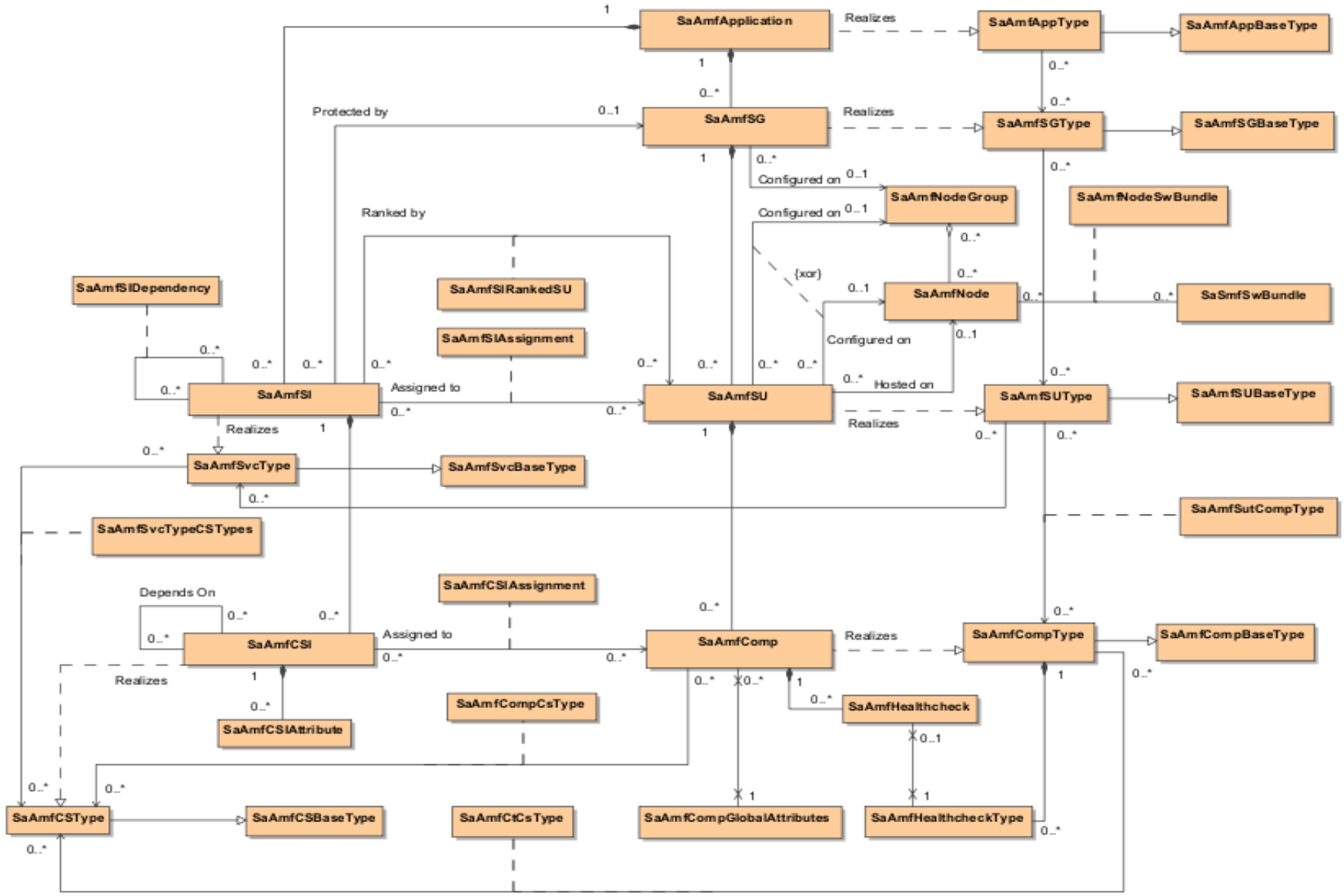
Information model - instance view

FIGURE 29 3.2- AMF Instances View



Information model - complete view

FIGURE 28 3.1- AMF Instances and Types View



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OpenSAF AMF in 3.0

- AvSv - Availability Service includes AMF, CLM, BAM, AVM, …
- Configuration *pushed to* AMF from MASv
- MW & Application configuration defined using XML files with a proprietary schema
- Configuration changes done using SNMP commands
- Alarms and notifications sent as SNMP traps
- Admin operations done using SNMP commands
- API and Information model B.01

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OpenSAF AMF in 4.0

- AvSv == AMF
- Configuration is *read from* IMM
- Applications are added after the system has started using SMF and a Single Step Upgrade campaign
- Configuration changes done using IMM
- Alarms and notifications sent using the NTF service
- Admin operations exposed through IMM
- API B.01 (same as in 3.0)
- Information Model B.04

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AMF Configuration

- The AMF model for the middle-ware is defined as *part of* an XML file following the standard SA-Forum IMM XML schema.
- This file is known as *imm.xml*
- imm.xml is *generated* by tools included in OpenSAF and should not be created or modified by hand.
- A few legacy configurations options exist, defaults should be fine for most users (see *amfd.conf* respectively *amfnd.conf* for more info)

Generating the MW Configuration

```
$ cd /usr/local/share/opensaf/immxml
```

Generate a nodes.cfg file (input to immxml-configure):

```
$ ./immxml-clustersize -s 2 -p 6
```

Edit third column (CLM node) to the same as the short host name:

```
$ vi nodes.cfg
```

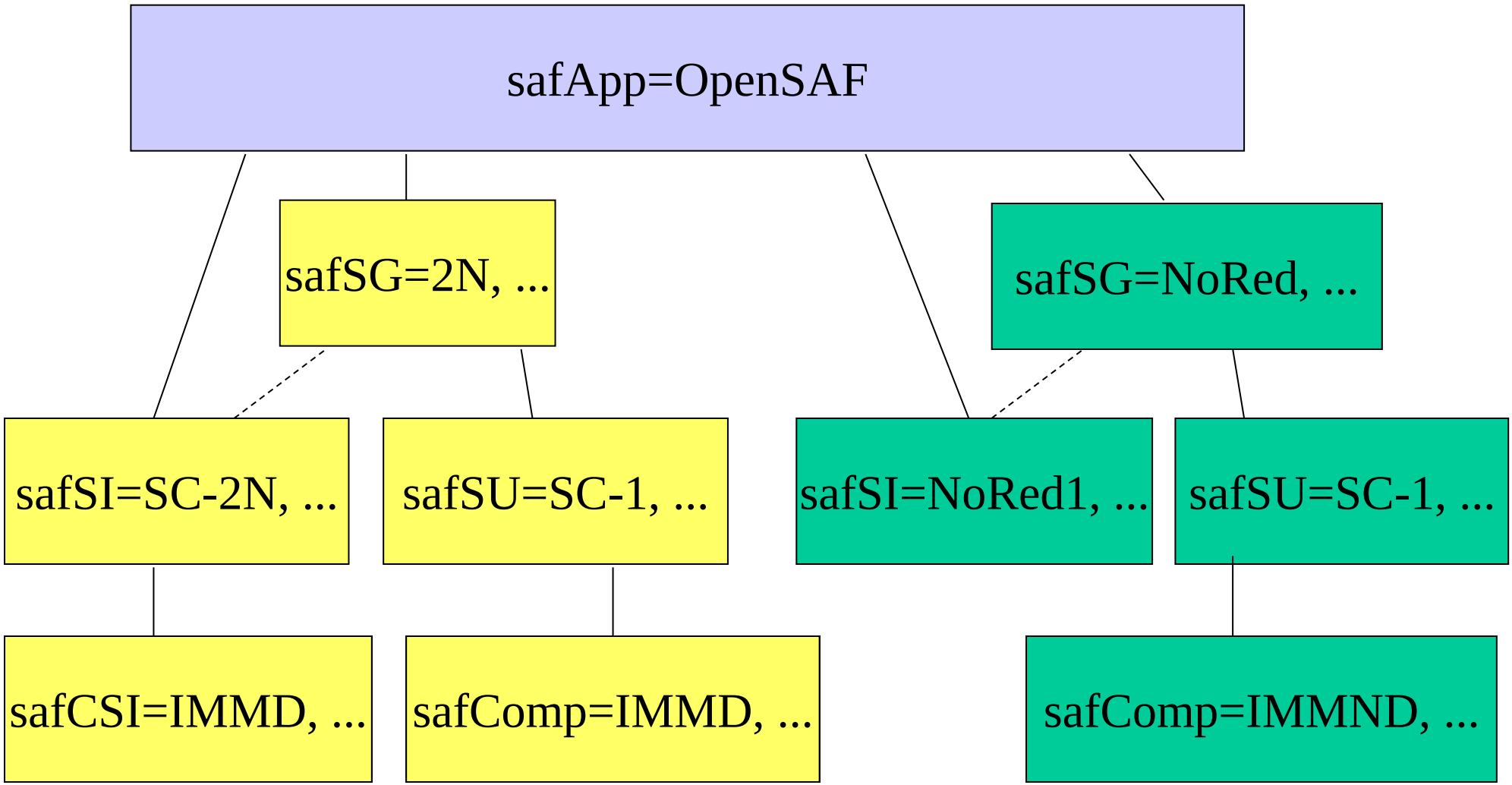
Generate an imm.xml file:

```
$ ./immxml-configure
Successfully generated the imm file:
./imm.xml.20100519_1000
```

Copy and rename the file to IMMs read location:

```
$ cp ./imm.xml.20100519_1000 /etc/opensaf/imm.xml
```

MW AMF Model


safApp=OpenSAF
safSG=2N, ...
safSG=NoRed, ...
safSI=SC-2N, ...
safSU=SC-1, ...
safSI=NoRed1, ...
safSU=SC-1, ...
safCSI=IMMD, ...
safComp=IMMD, ...
safComp=IMMND, ...

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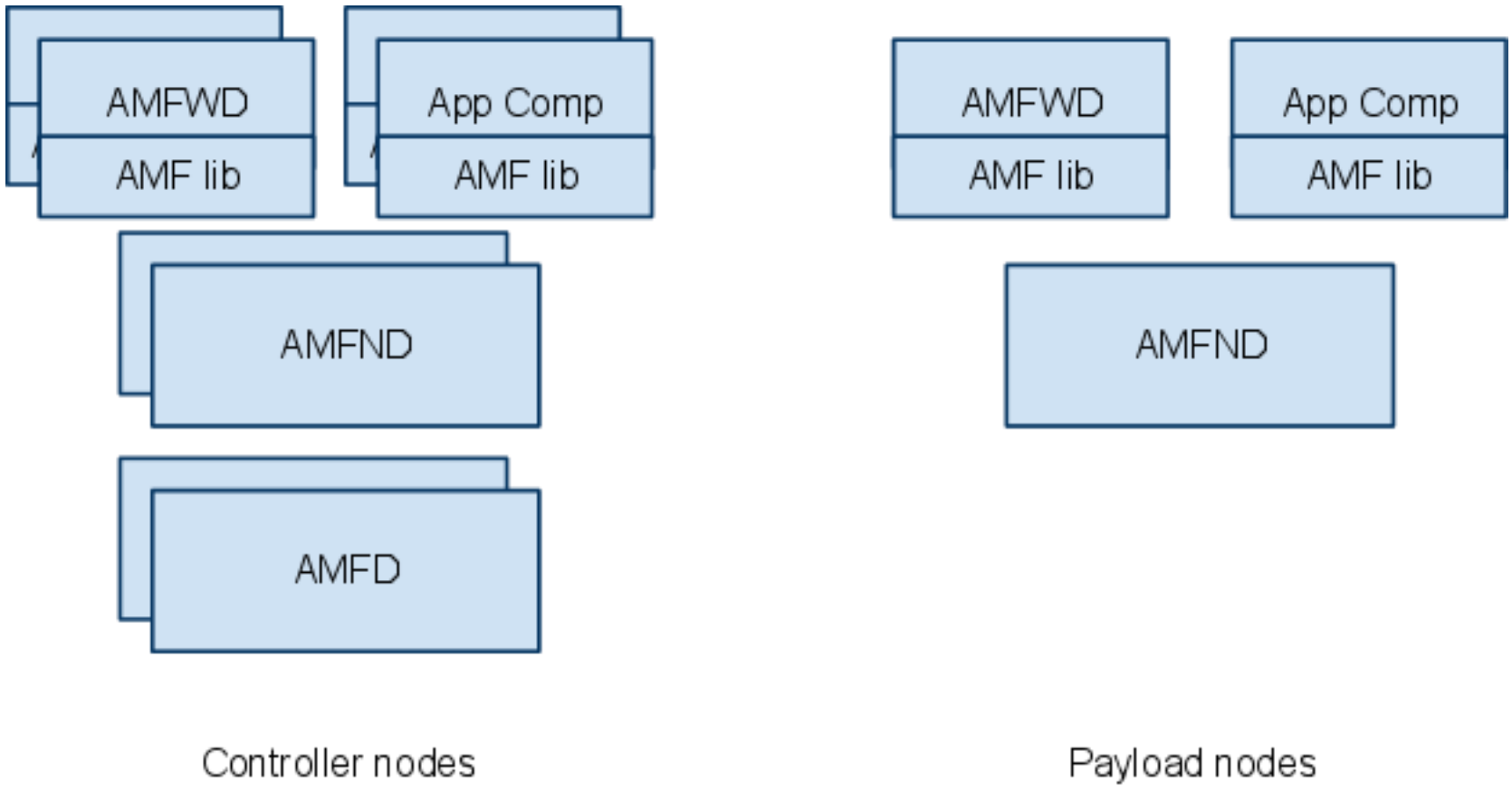
New AMF Implementation Architecture

- 3 tier architecture
- Director – **osafamfd**, runs on controllers in a 2N configuration. Implementer of the AMF model. Maintains and coordinates AMF cluster wide resources.
- Node director – **osafamfnd**, run on all nodes in the cluster. Controls life cycle of components and serves the API.
- Library (a.k.a. agent) linked with the application.
- Watchdog - **osafamfwd** (4 tier?)

AMF Implementation Architecture...



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Alarms & Notifications

- AMF uses the NTF service to send notifications to management applications
- Sent notifications are a subset of the ones defined in the B.04 specification.
- All legacy notifications have been removed.
- Two types: alarms & state change notifications
- Alarms logged by NTF to the LOG Alarm stream.
- State change notifications logged by AMF to the LOG System Stream

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AMF Logging

- AMFD uses the system stream of the LOG service to log important cluster significant AMF events
- The Linux system log (syslog) is used to log runtime/program errors
- AMFD does not log anything using DTSv
- AMFND still logs some events using DTSv
- Starting point for troubleshooting: Linux syslog on active controller or node where the problem appears

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AMF Trace

- Targeted to developers & function testers
- By default disabled
- Offline enabled by editing amfd.conf & amfnd.conf
- Online enabled by sending a USR2 signal to the process (osafamfd resp. osafamfnd)
- The signal toggles trace on/off
- Output normally in /var/log/opensaf/<progname>

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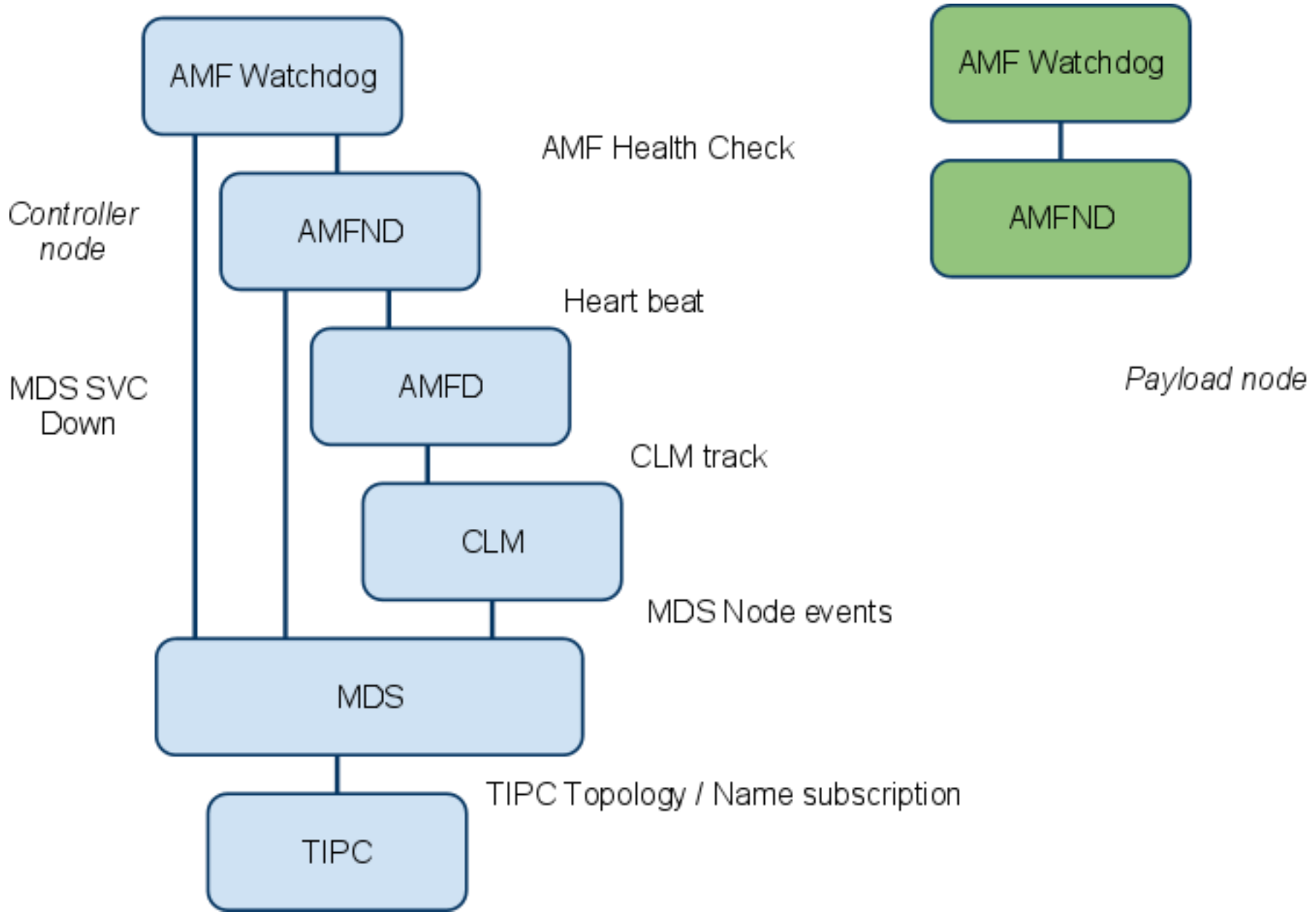
AMF internal supervision

- AMF must maintain HA of itself, noone else will!
- In 3.0 AvSv used heart beating between its distributed parts (implementing CLM cluster membership)
- In 4.0 AMF *uses* CLM
- AMF Watchdog is a new AMF component, supervises the node director
- Node director supervises the director
- Supervision is node local!

Supervision



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Other Improvements

- OpenSAF contains tools to generate MW config
- Automatic clearing of the SI Unassigned alarm
- Use of SAF LOG System stream
- Improved logging in general at error conditions e.g. CLC-CLI errors
- CSI Assignments in parallel - faster switch over
- Controller switch over triggered by a standard admin operation SI-SWAP on OpenSAF 2N SI

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Not supported/working

- B.04 API
- Container/Contained
- Cluster reset as recovery action
- Removing an application by just deleting the top object
- Some admin operations like EAM_START & EAM_STOP
- Admin operations not supported on all objects; e.g. RESTART of cluster, application, node and SU
- Specifying environment variables for components in the model
- Not working: SI-SI dependencies, inter node Proxy-Proxied/External components support not working
- Notifications not sent: Error Report notification, Error Clear notification, HA Readiness State notification, …

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Tools for deployment and test

- Tools for deployment
  - *immxml-clustersize* generate nodes.cfg
  - *immxml-configure* generate imm.xml using nodes.cfg
- Tools to manage the information model
  - *immadm, immfind, immlist, immcfg*
  - *immcfg –f* add classes/objects to IMM from XML
- Tools to manage the AMF part of the IM
  - *amf-adm, amf-find, amf-state*
- NTF Tools
  - *ntfsubscribe* subscribe to alarms and notifications
  - *ntfsend* send a notification

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Future

- Implement B.04 API
- Implement Container/Contained
- ...

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Questions?