ACTACOR®
Integrated Security Solutions

DEFENCE AND SPACE

Andreas GUTHER, Team Lead
April 2018

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Agenda

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What is Actacor®?

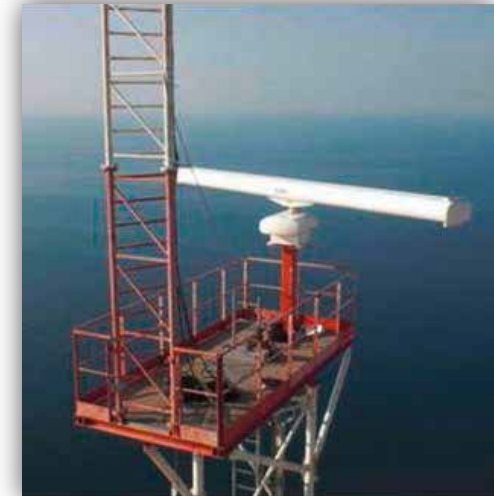   ACTACOR® – Integrated Security Solutions

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Actacor®

The threats

- Illegal migration

- Illegal trafficking of goods (drugs, arms, etc.)

- Terrorist attacks

- Piracy

- Risks against critical infrastructures and special interest areas such as EEZ (Economic Exclusive Zones), ports and airports, oil & gas installations

- Pollution and security threats against tourist areas or nature reserves

- Other threats in the border and national security domain

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Product Line

Actacor®

ActaSense
Optimise surveil-
lance according
to customer
requirements

ActaLead
Decide, organise,
command and
communicate

ActaAct
Support forces in
countering threats

Actacor® Service capabilities
Build the optimum system according to customer requirements.
Learn and improve with our training and live monitoring capabilities.
Through-life support for all operations and maintenance of the system.
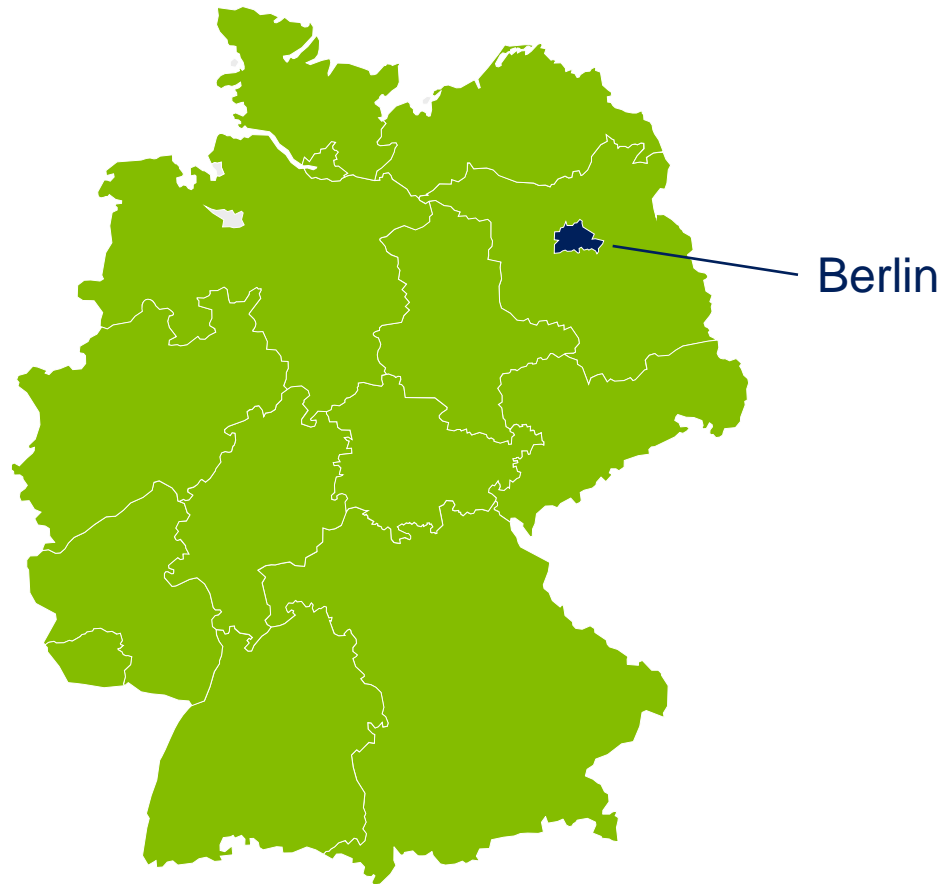Managed services covering all security needs.

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ActaSense

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ActaLead

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ActaAct

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Typical System Example

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Example – National

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Example – National HQ

Berlin

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Example – Region

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Example – Regional HQ
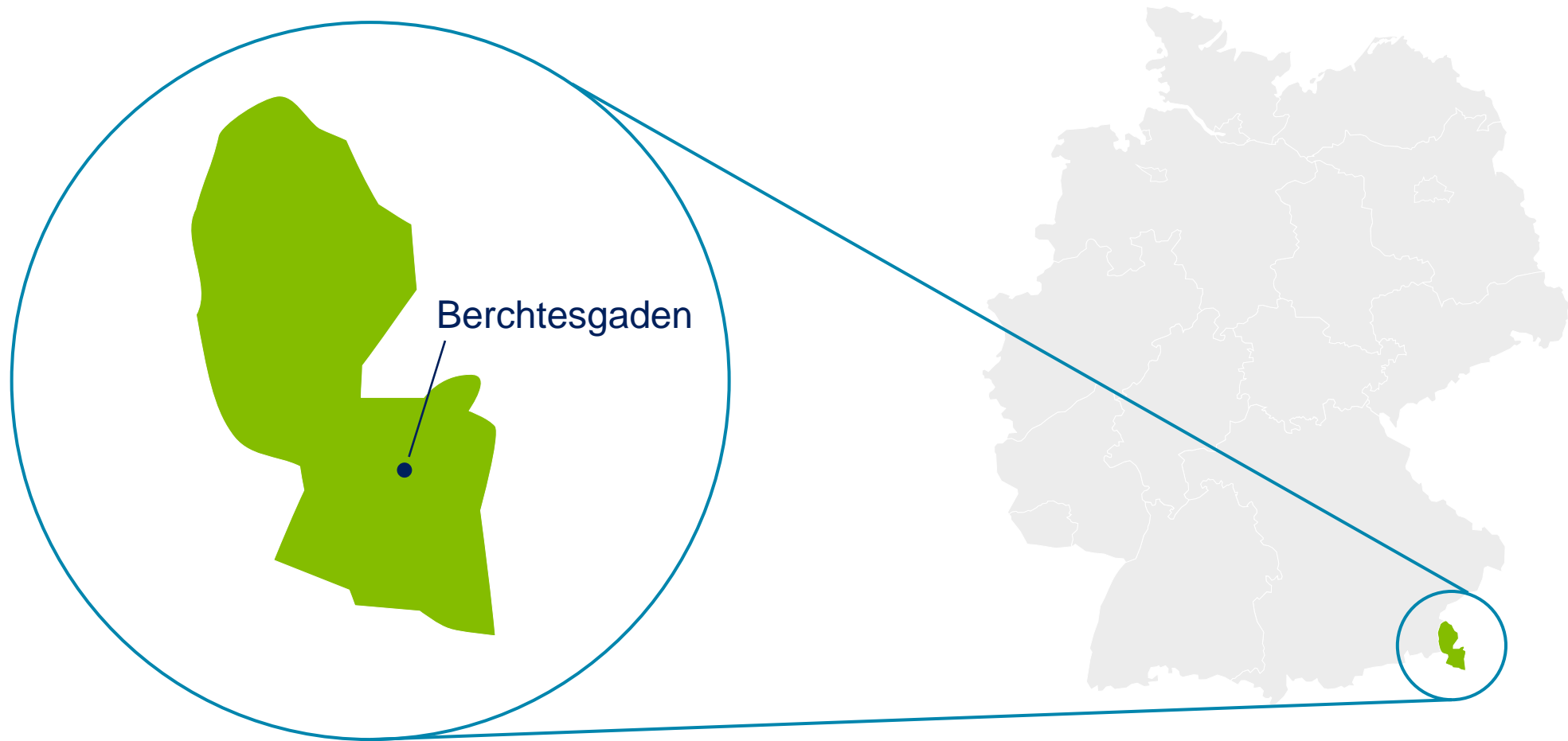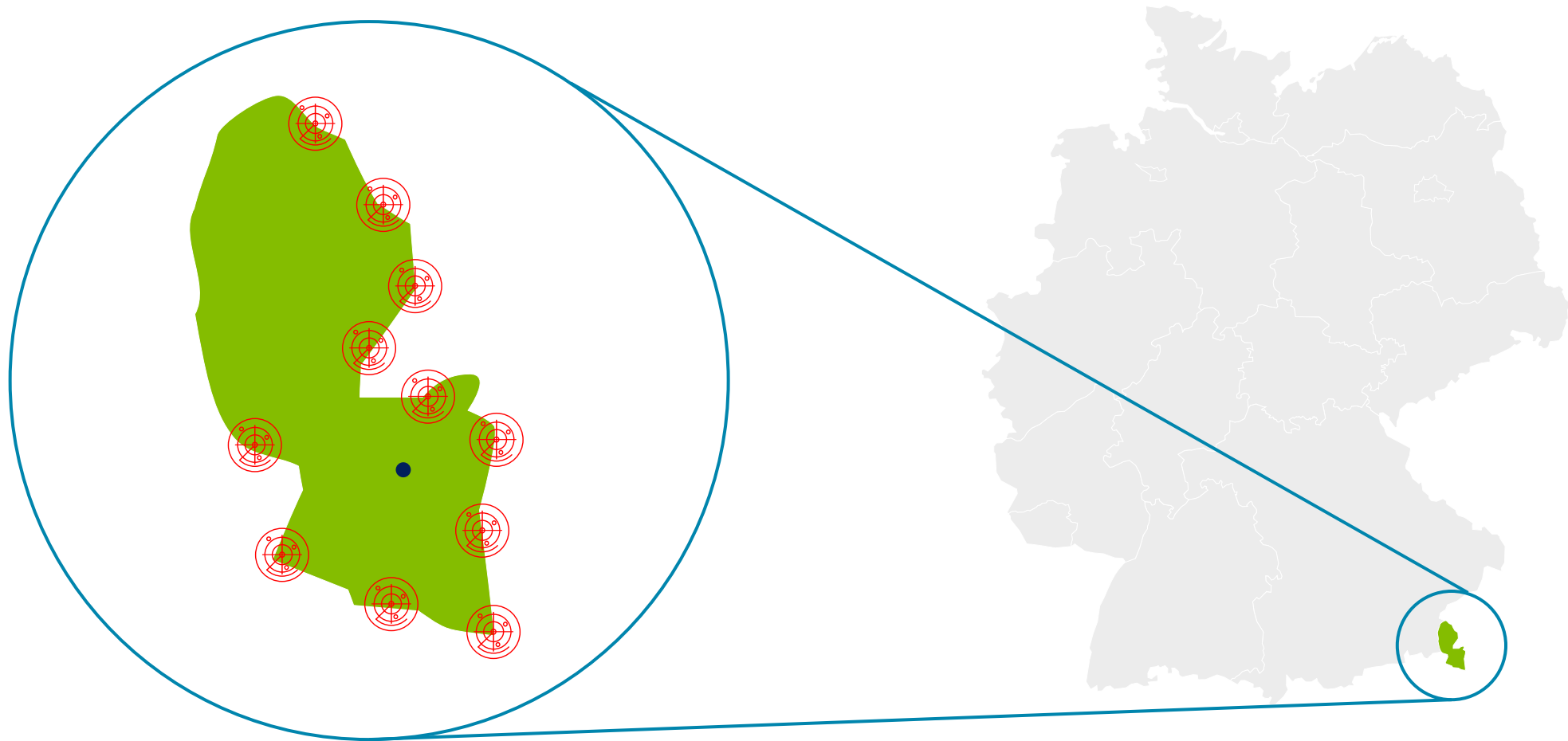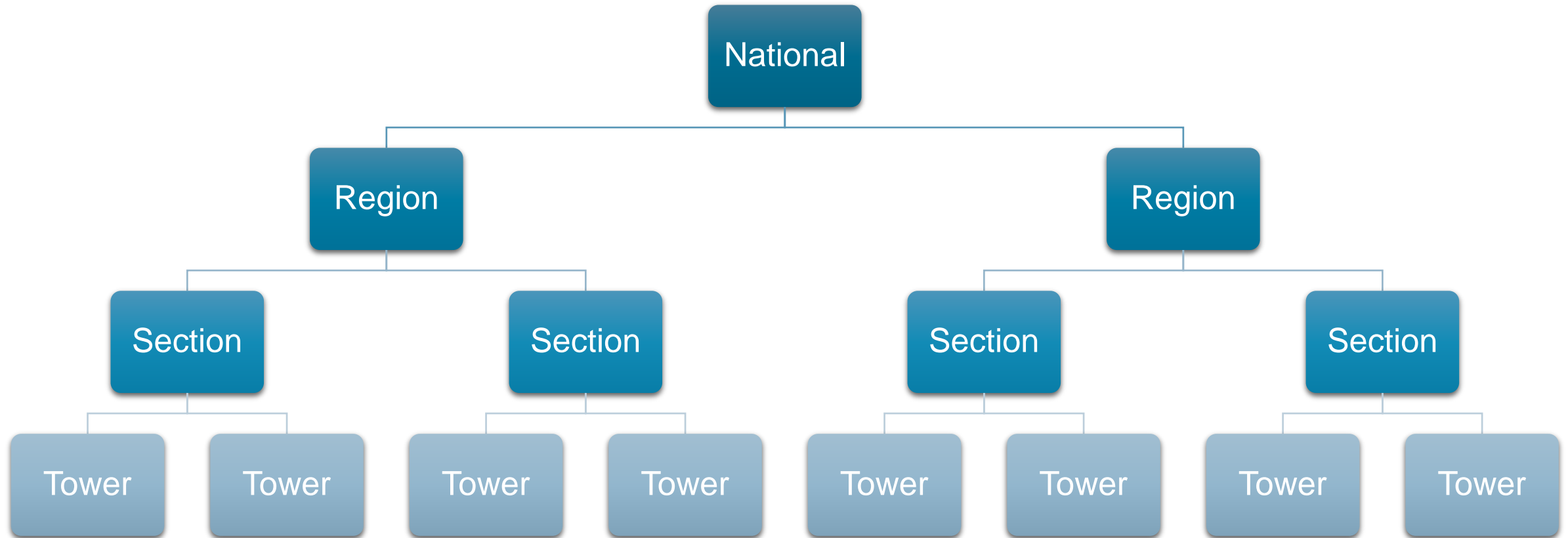
Munich

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Example – Section

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Example – Sectional HQ

Berchtesgaden

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Example – Towers

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Usual Hierarchy

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Key challenges

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Key Challenges

Deliver data on time

Limited Bandwidth
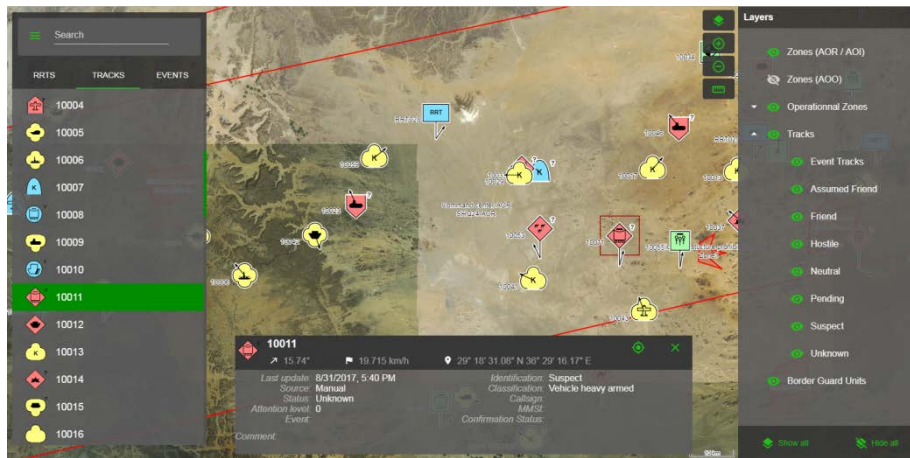
Unreliable Network / Failover

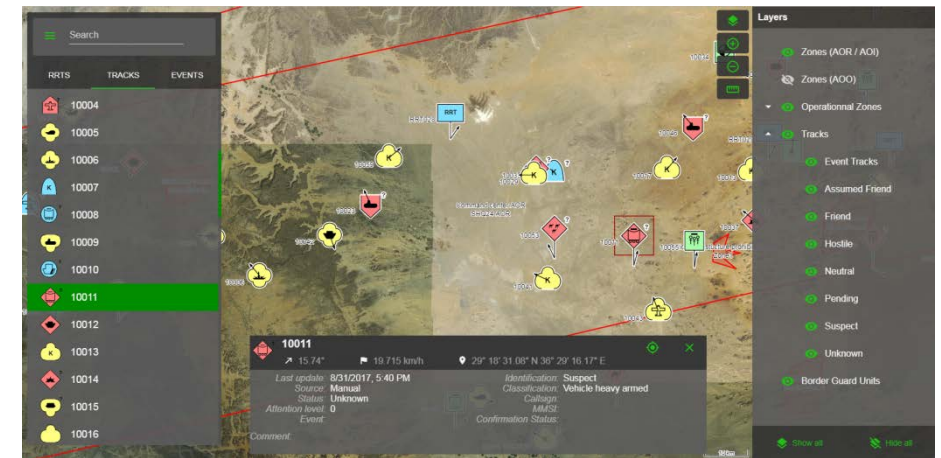Scaled deployment and runtime

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Deliver data on time – Common Operational Picture (COP)

National

Regional

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Scaled deployment and runtime

Locations
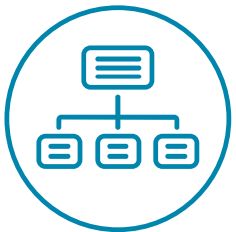- 50 Datacentres
- 200 Servers

Processing Power
- 2 000 CPUs
- 12 800 GB RAM

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Scaled deployment and runtime

Load

- 20 000 System-Tracks from up to 200 000 Local-Tracks

Operational Software

- 2 000 Services
- 3 500 Domain Participants
- 15 000 Data Writers
- 13 000 Data Readers
- 160 Topics

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Solutions

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Why RTI Connext DDS?

- Reliable and timely delivery of data and detection when time is not met

- Find grained control of data distribution due to

  – Domains

  – Topics

  – Partitions

- QoS to meet requirements and ease application development

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RTI Products in use

Production

- RTI Connext DDS

- RTI Persistence Service

- RTI Routing Service

- RTI Tools (rtiddsping)

Development (non-redist)

- RTI Admin Console

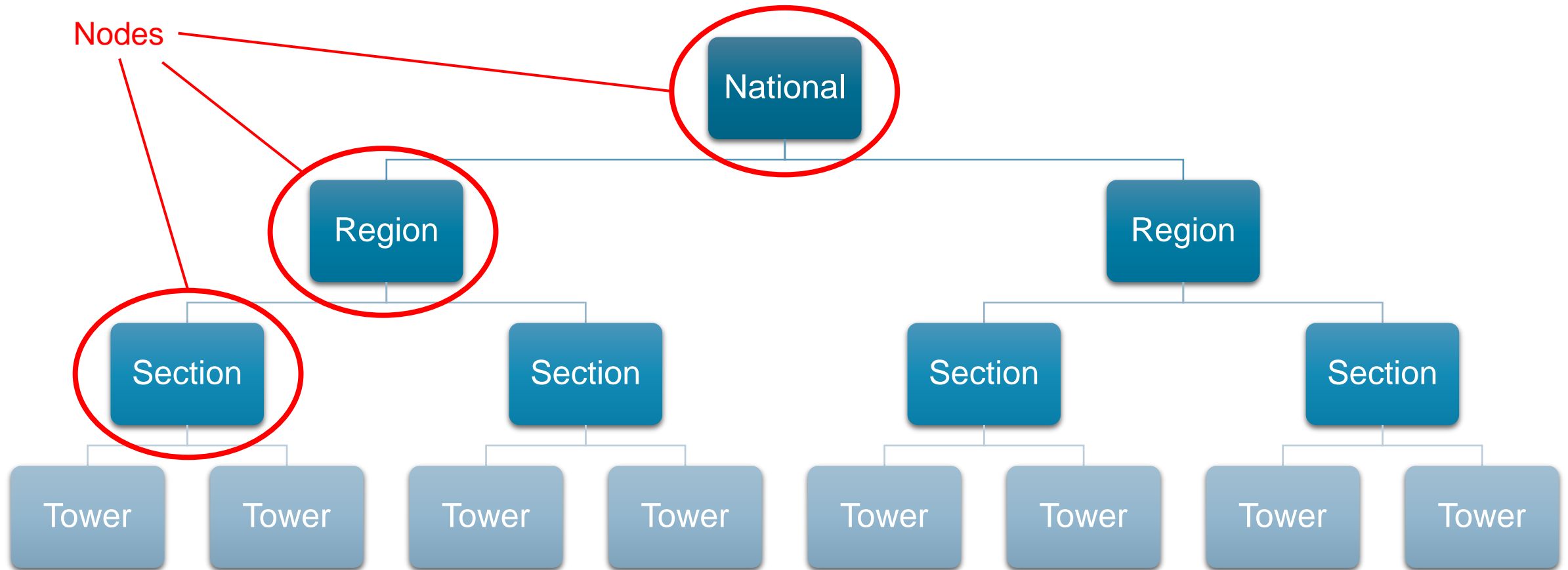**AIRBUS**

Key Challenges

Deliver data on time
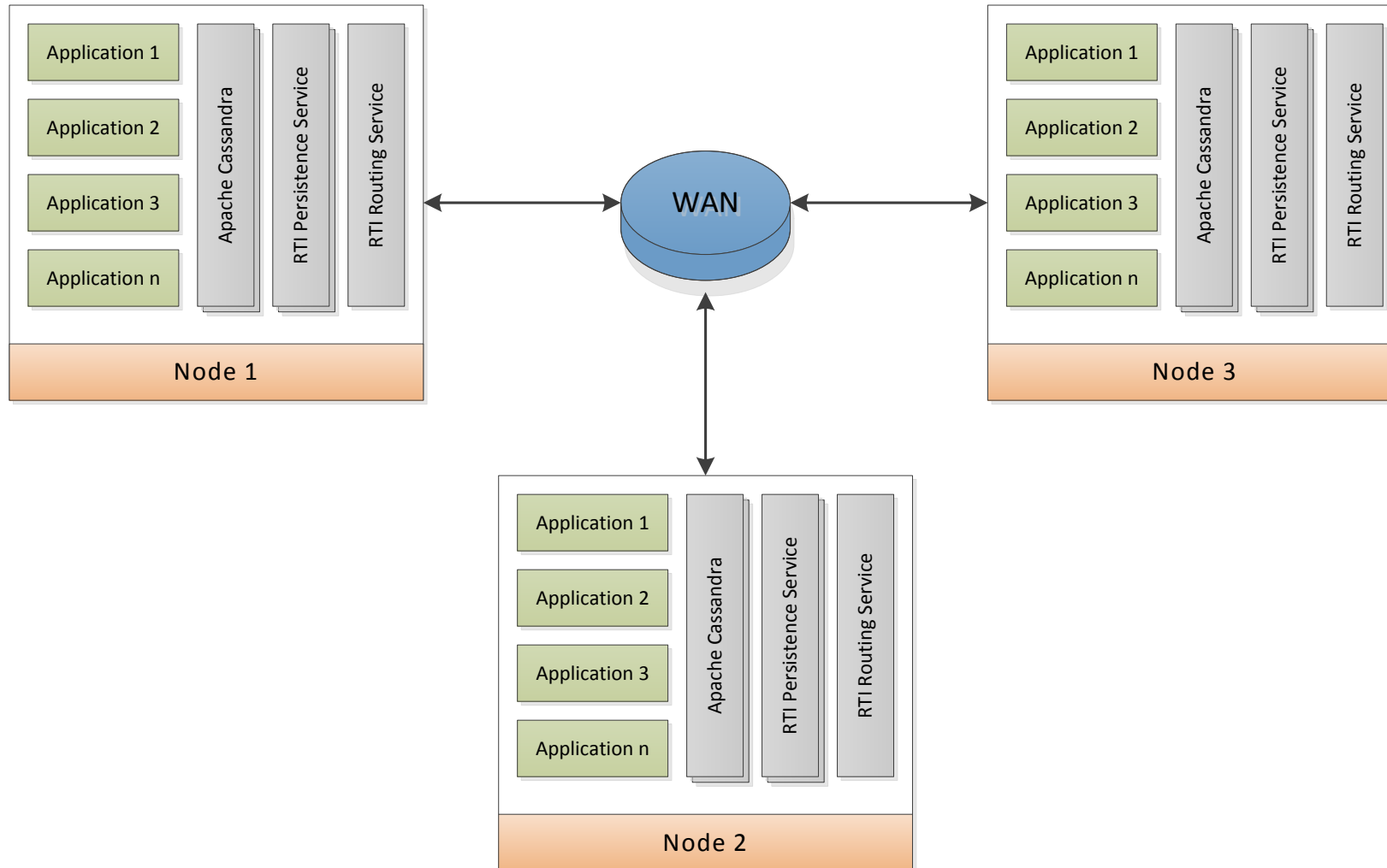
Limited Bandwidth

Unreliable Network / Failover

Scaled deployment and runtime

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Node Definition

Nodes

National

Region

Region

Section

Section

Section

Section

Tower

Tower

Tower

Tower

Tower

Tower

Tower

Tower

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Architecture – System

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Architecture – SW Stack

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Actacor Interface

Example QoS settings in use

QoS Setting	Value
reliability	RELIABLE_RELIABILITY_QOS
durability	TRANSIENT_DURABILITY_QOS
history.kind	LAST_HISTORY_QOS
history.depth	3
lifespan	30 s
deadline	40 s

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Key Challenges

Deliver data on time

Limited Bandwidth

Unreliable Network / Failover

Scaled deployment and runtime

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Network Load Balancing
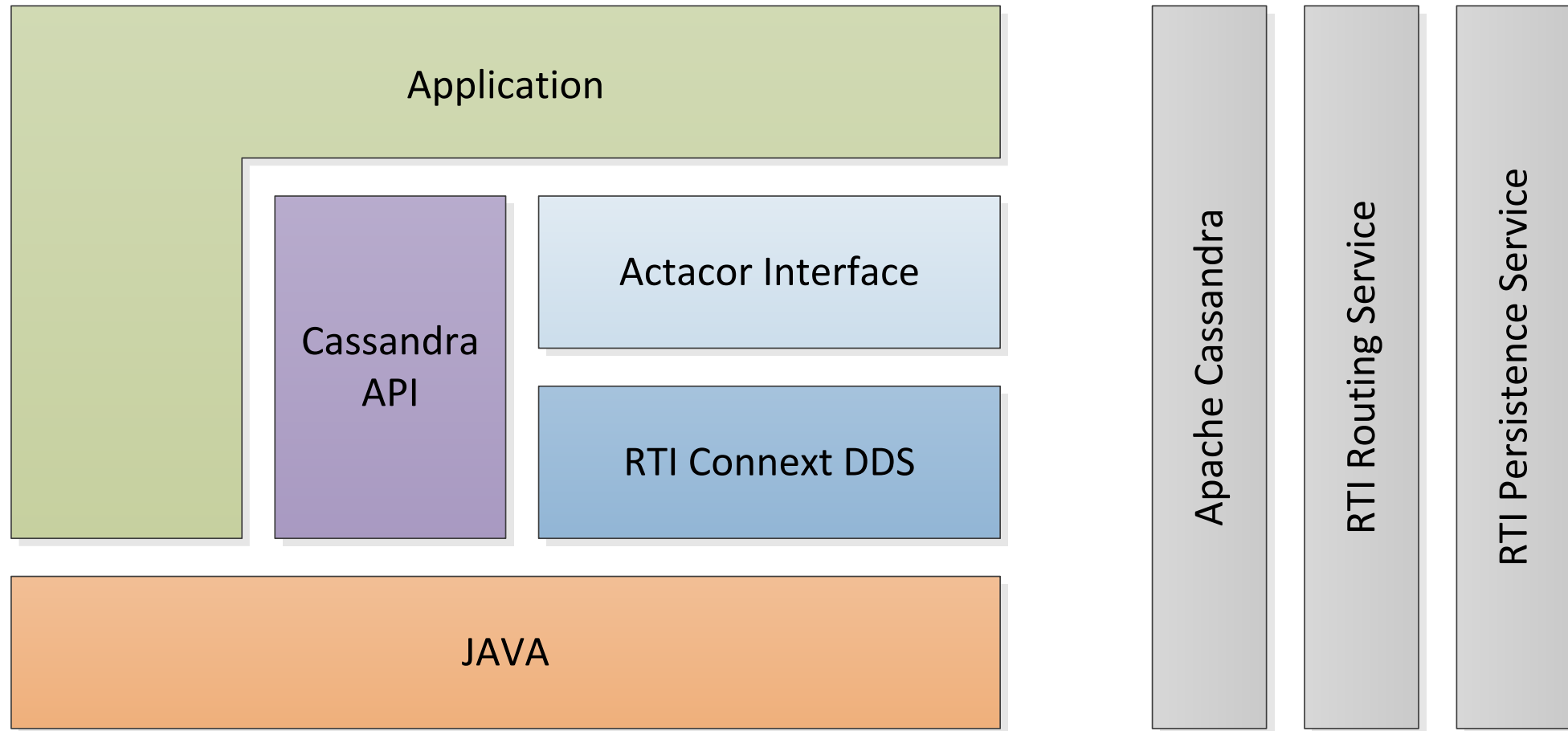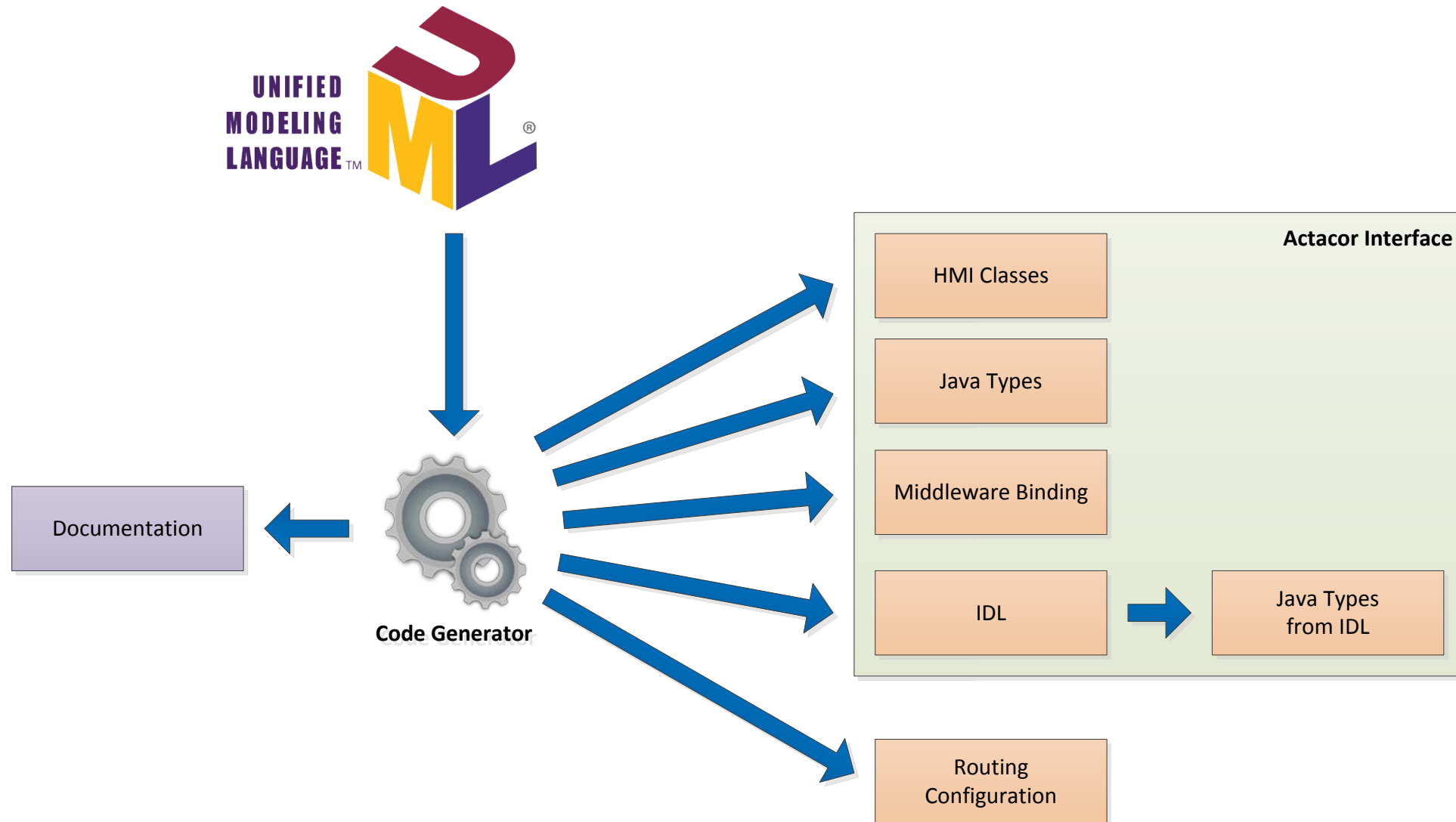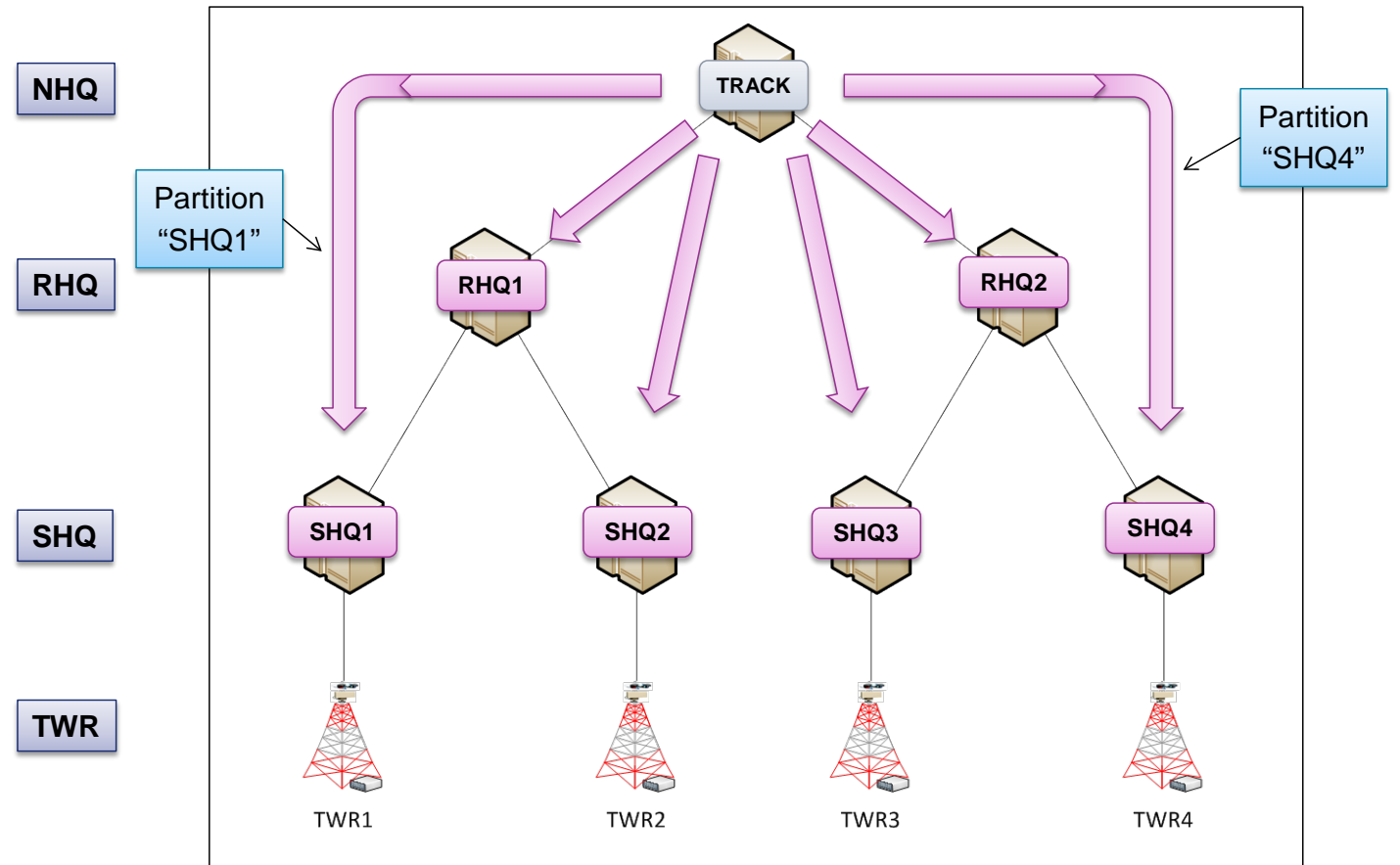
- In a large system there can be a lot of data that not everyone is interested in

- Partitions are used to distribute the data according to the interest

- Partitions are not needed to be known upfront and can be routed dynamically

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Key Challenges

Deliver data on time

Limited Bandwidth

Unreliable Network / Failover

Scaled deployment and runtime

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Orchestration Service

- Orchestration Service that starts, stops and monitors Applications according to configuration

- Load planning for CPU and Memory

- Application execution target can be Node or Global

- Supports split of a system due to network outage or other unavailability

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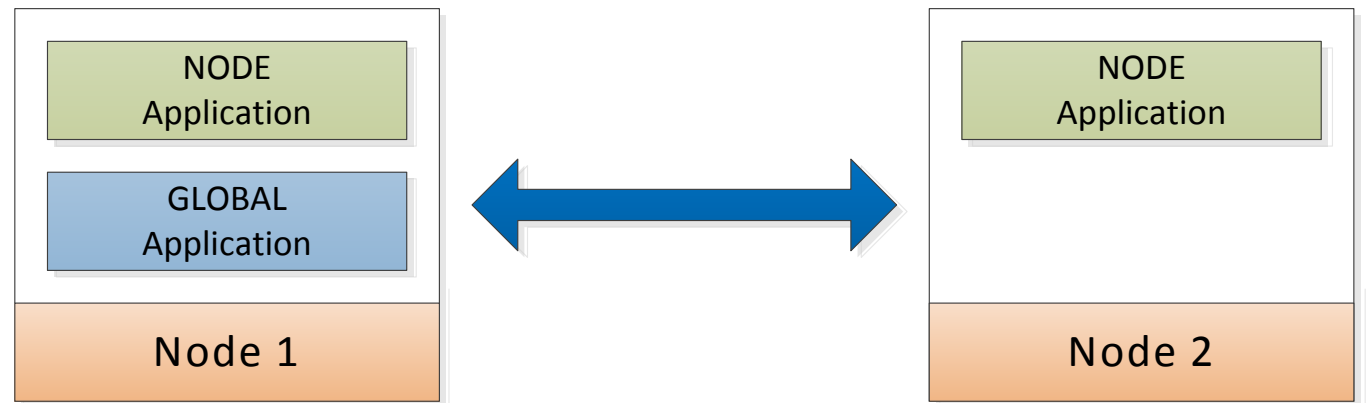# Orchestration Service – Voting

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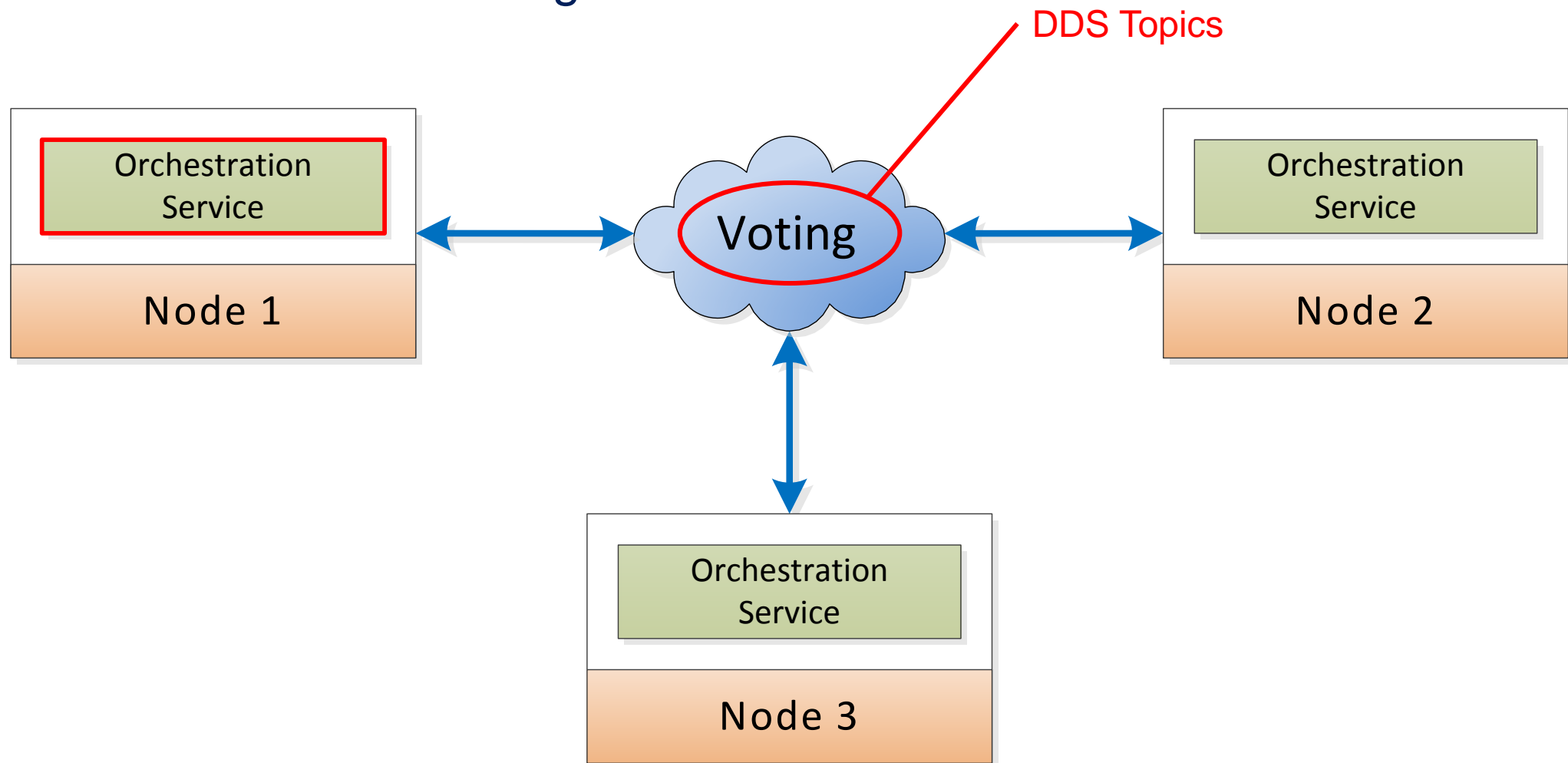
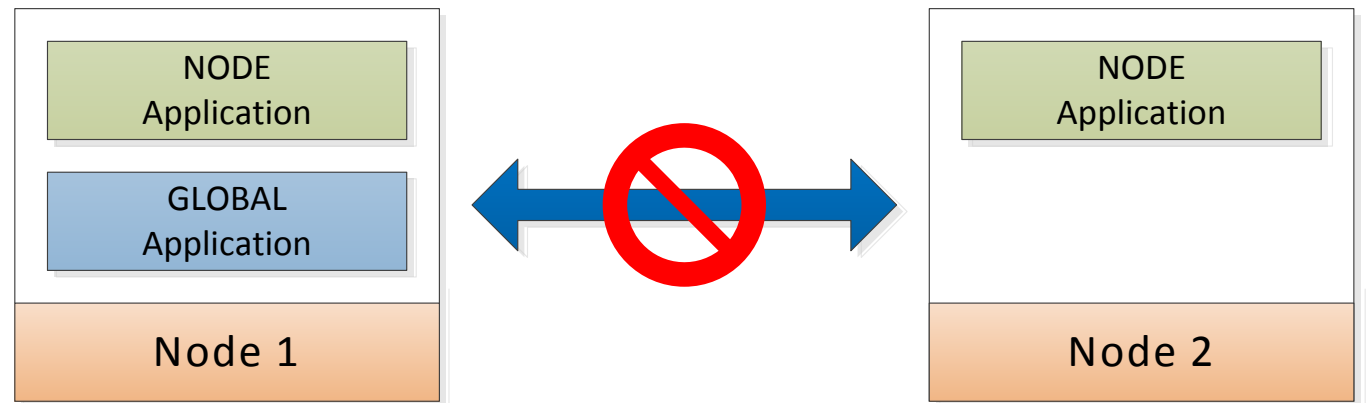# Orchestration Service – Controlling and Health Check

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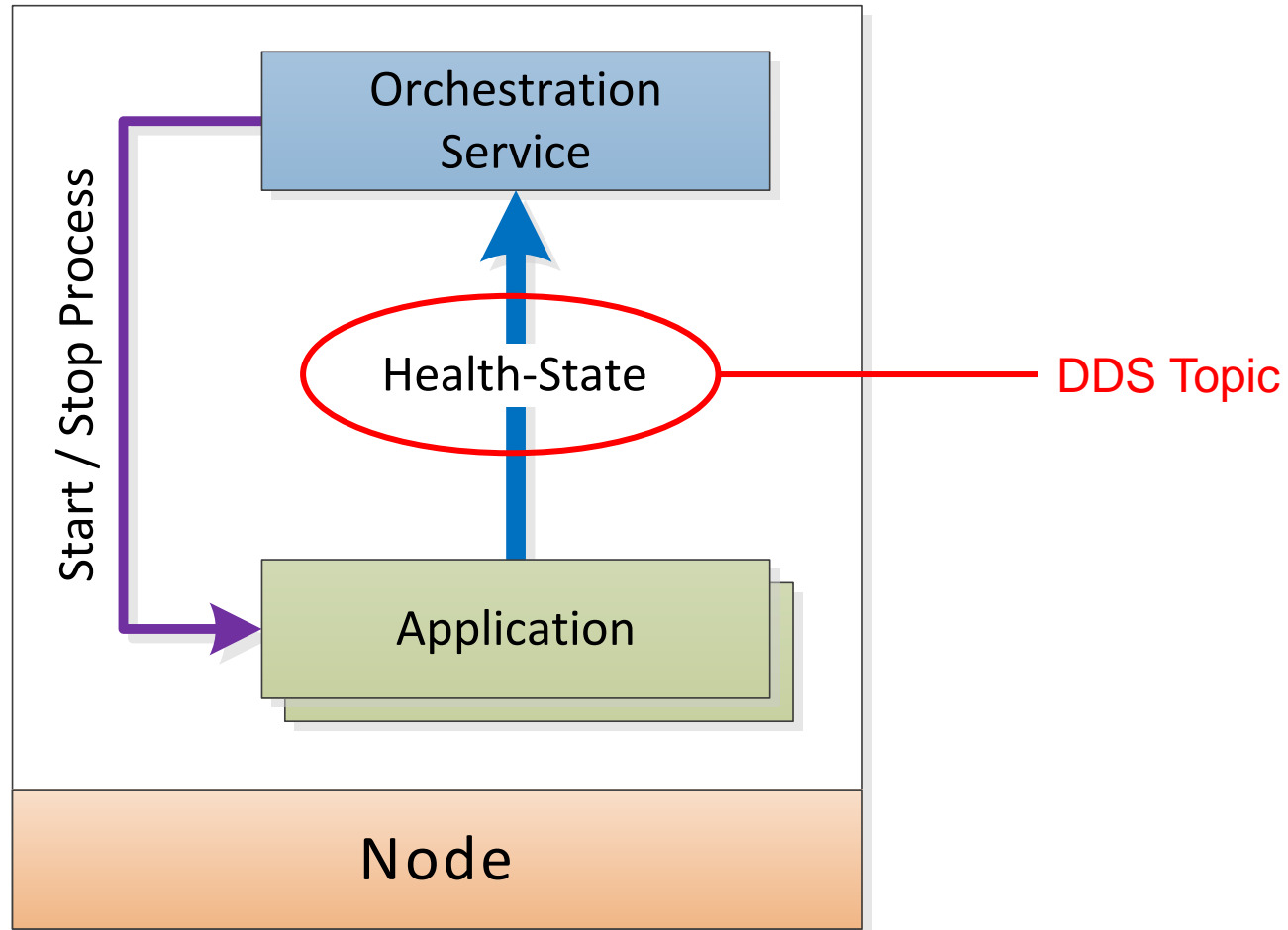
Orchestration Service – Normal Operation

- System is running in normal operation

- System shall execute
  - 1 NODE Application
  - 1 GLOBAL Application

- NODE Application   OK

- GLOBAL Application   OK

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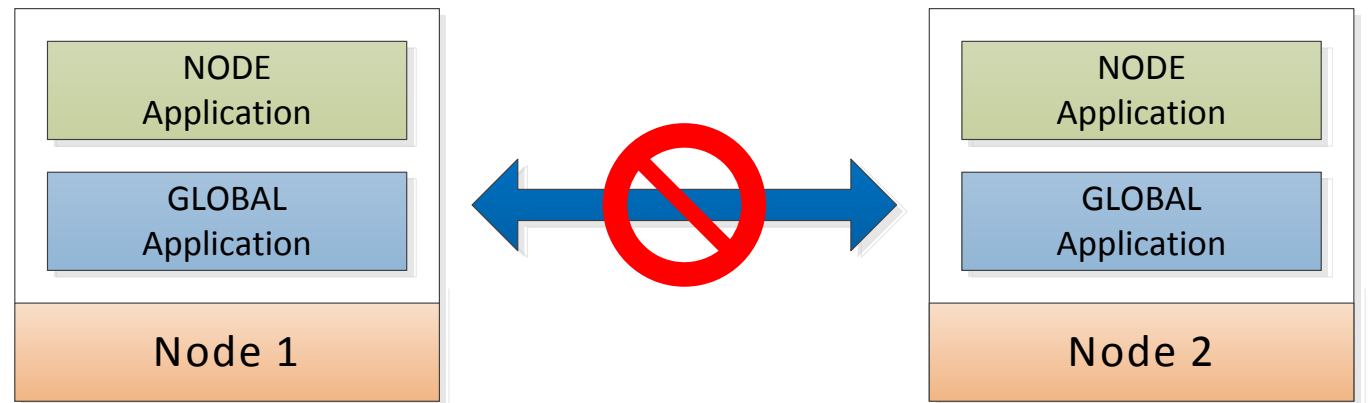# Orchestration Service – Network breakdown

- Connection between Node 1 and Node 2

  becomes unavailable

- System is split up into two systems
  - System 1 with Node 1
  - System 2 with Node 2

- NODE Application   OK

- GLOBAL Application
  - System 1   OK
  - System 2   MISSING

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Orchestration Service – Recovery

- GLOBAL Application is started in Node 2

  to comply with configuration

	NODE Application
	GLOBAL Application
Node 1	

	NODE Application
	GLOBAL Application
Node 2	

- NODE Application   OK

- GLOBAL Application

  – System 1   OK

  – System 2   OK

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Orchestration Service – Network available again

- Connection between Node 1 and Node 2
  is available again

- System 1 and System 2 are merged into
  one joint System

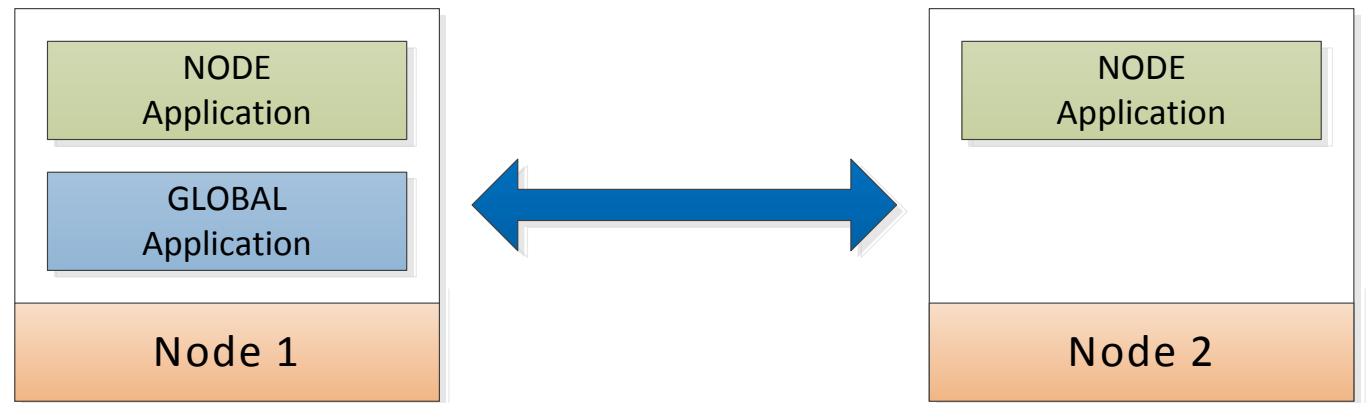- NODE Application   OK

- GLOBAL Application   TOO MANY

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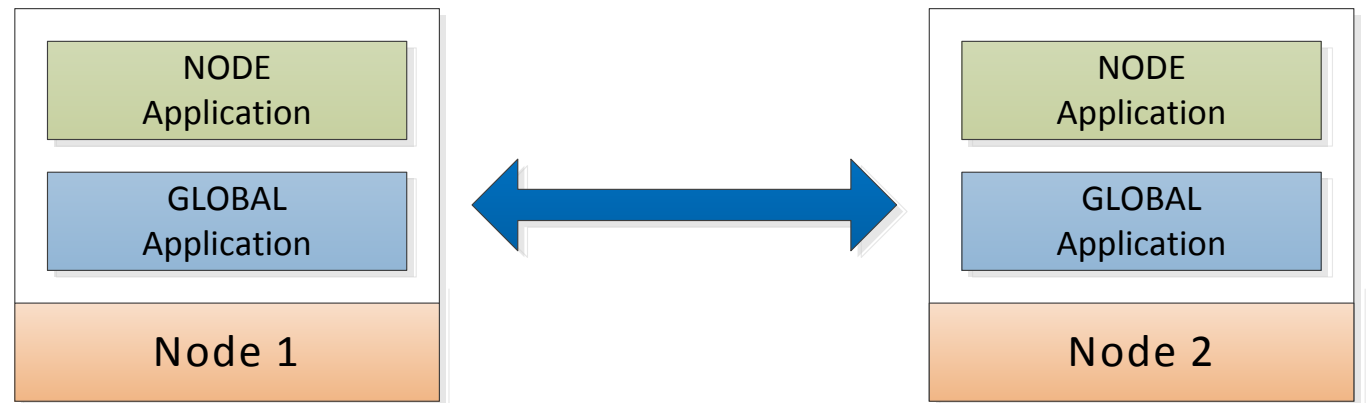
Orchestration Service – Normal Operation

- System is running in normal operation

- NODE Application OK

- GLOBAL Application OK

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Key Challenges

Deliver data on time

Limited Bandwidth

Unreliable Network / Failover

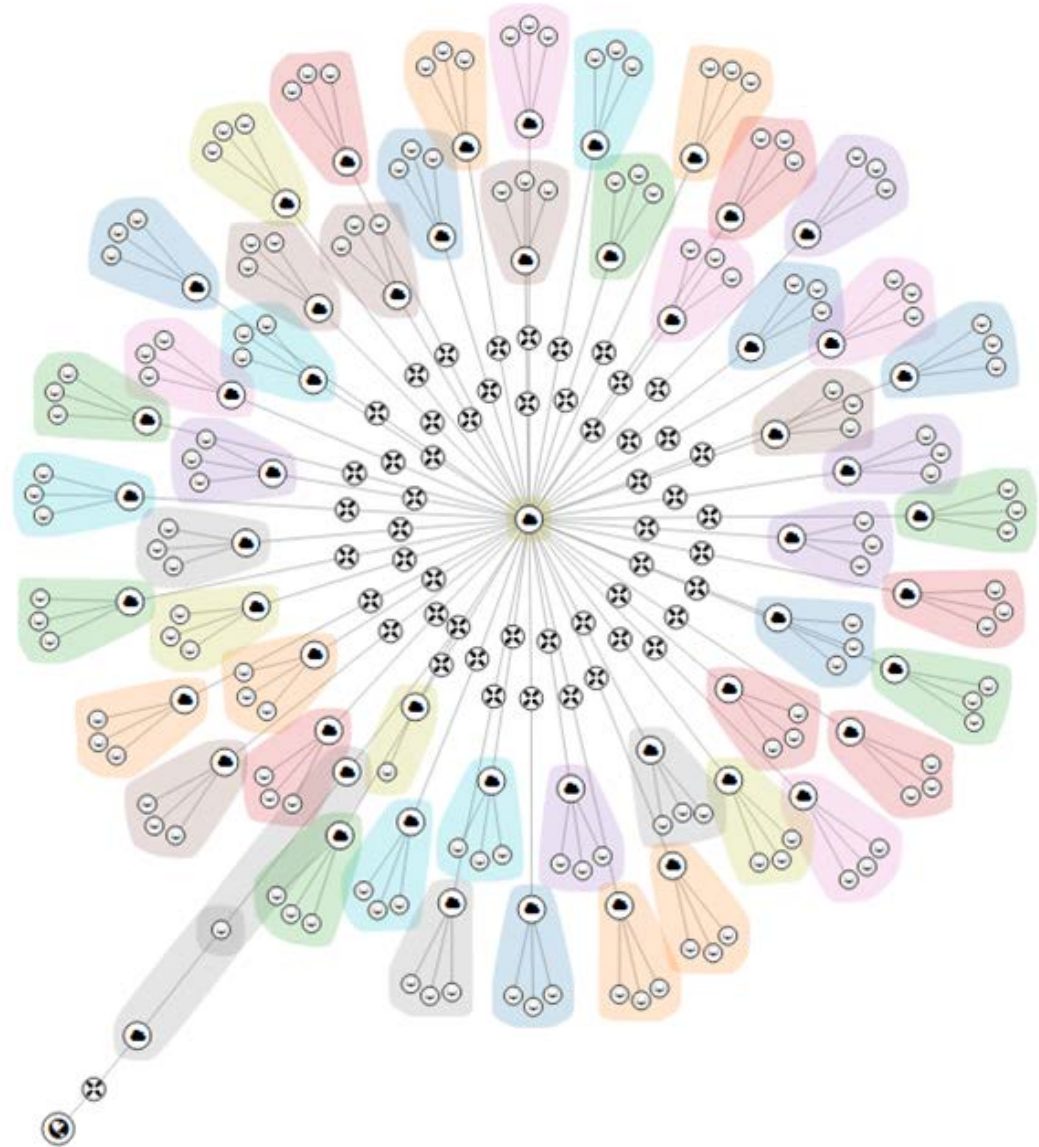Scaled deployment and runtime

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Deployment

RPM Packages

- RTI Connext DDS

  - Runtime

  - Applications (Persistence, Routing, Tools)

- Base QoS profile library

- Routing Configuration

- Actacor Interface

- Applications

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Scalability Testing in the Cloud

- OpenStack running on premise

- Automated deployment using

  – Terraform

  – Ansible

- 50 + 1 Networks → 50 Datacentres

- 150 Servers

- WAN simulation using netem

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Links & Resources

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Links & Resources

- http://www.airbus.com/defence/security-solutions.html

- https://github.com/aguther/rti-connext-dds-pro

  Gradle scripts to build RPM packages for RTI Connext DDS Pro

- https://github.com/aguther/dds-examples

  Example usages and some utilities:
  – Discovery monitoring using built-in topics
  – JSON reading / writing using GSON library
  – Using mutable types (similar to Google protobuf)
  – Routing (static & dynamic)
  – Shape Publisher & Subscriber

- https://github.com/aguther/containers-rti

  Example using Vagrant how to use DDS with cloud technologies:
  – Docker
  – Kubernetes
  – Nomad

- https://hub.docker.com/r/guther/rti-perftest/

  Docker Image with *rtiperftest* that is being used in repository containers-rti

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Thank you

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