Virtual centre application use case study: Concept of operation for multi-remote virtual tower operation
Virtual centre from communication perspective

- Concept – What is a true virtual centre
- Virtual centre in ACC - Dynamic sectorisation
- Virtual centre use case – Remote Virtual Tower
Virtual centre: Driven by the master plan

Airspace use will be optimised through dynamic demand and capacity management, queue management, flexible military airspace structures, direct routing and dynamic airspace configurations.

- There is a need for a more flexible use of communication resources to meet the needs of flexible airspace use
- Communication infrastructure needs to be able to adapt quickly to the current traffic situation
- Controllers need to be able to access communication resources as required by the traffic pattern

Time based operation

• Step 1

- Trajectory & Performance based operation

• Step 2
→ Any controller, any frequency at any site

Today
Limited collaboration

Forseeable Future
Substantial collaboration

Need for collaboration in and between ANSPs

CONNECTIVITY VIA VOIP

→ Based on ED-137
→ Provides basic interoperability (radio, phone, intercom)
→ VoIP radio networks
→ Eliminates legacy lines

COLLABORATION BETWEEN NETWORKED VCS

→ Based on shared assets and cross-center sector handover
→ Needs standards for collaboration
→ Improves efficiency

VIRTUAL CENTERS BASED ON OPEN STANDARDS

→ Based on communication services in the ATM network
→ Accesses services from where controllers are
→ Eliminates traditional VCS silos & costs
Network centric voice services as flexibility enabler
Virtual Center: VCS3020X and Dynamic Sectorization
Changing operational concepts - Flexibilisation

- Dynamic re-sectorisation allows for maximal flexibility in controlling the airspace
  - efficiently run day to day operations
  - contingency during disaster scenarios

- Technical systems have to bridge the lack of flexibility in the fixed physical radio infrastructure and the need of flexible use of them
  - changes in the operational concepts
  - technical and operational interoperability on international level through standardization

**FRQ Contribution:** The interoperable system of systems built on standards that hides the complexity from the controllers.
Goals for Voice Communication based on VoIP

- Common access to communication infrastructure between different air traffic control centres across borders
  - Increasing the service availability through a networked approach
  - Using communication infrastructure to allow for operational flexibility and increasing efficiency
- Internetworking based on EUROCAE & ICAO recommendations
  - Based on VoIP for ATM: ED-137

ED-136, ED-137, ED-138
Defined IP Voice ATM Systems and identify their components (Voice Communication System / VCS, Ground based Radio Station / GRS...)

VIENNA AGREEMENT PAPER
13.09.2004
## VCS 3020X & Dynamic Sectorisation

<table>
<thead>
<tr>
<th>Sharing workloads</th>
<th>Sharing resources</th>
<th>Sharing management responsibilities</th>
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<tbody>
<tr>
<td>• VCS 3020X increases efficiency by integrating an advanced role concept. This allows workloads to be easily distributed across control centres at times of peak activity, while sectors can be merged when traffic is low.</td>
<td>• Sharing of radio resources: different ANSPs must be able to access the same radio communication equipment in a safe and reliable manner.</td>
<td>• Sector delegation: To ensure that no airspace is ever left unassigned, the handover of airspace responsibilities is conducted through an acknowledged workflow process, where the VCS 3020X Release 8.0 guarantees a gap-free handover.</td>
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Role Delegation Overview

Radio Sites
- North -

3rd party VCS or SIP Phone

Centre “North”

Role locations are stored in the RLS

Sector delegation is an acknowledged procedure initiated from the VCMS

Handover is failsafe and seamless for both A/G and G/G communication partners

New sector responsibility is integrated in the receiving center, using RLS updates

Role Contact
N1 N1@10.17.25.50
S5 S5@10.18.25.75

RLS REGISTRATIONS

MISSION OP-N.1 ROLE N1 (F1|F2)

1. Operator at OP-N1 operates mission
2. Role N1 has been registered at RLS at IPIF of north centre

Centre “South”

Radio Sites
- South -

MISSION OP-S.1 ROLE S5 (F3)
REMOTE TOWER VOICE COMMUNICATION SERVICES

VCS 3020X
INVENTED TO PERFORM – TRUSTED BY THE WORLD
ATC TWR– Traditional Working Environment

Outside view

Voice Communications

Radar

Flight Strips & Info display
Remote Tower Solution - Centralize ATC for airports

Enable Remote Capabilities

IP Network (Voice, Data, Video)

Remote Tower Centre

Contingency Solution
smartVision – Enhancing the Tower View

Use of IR Technology, Object Tracking & Augmentation
Remote Tower Solution - Centralize ATC for airports
Remote Virtual Tower Centre – Voice Communication Services
Advantages of the RVT Virtual Centre

- By separating the control room user interface from the technical infrastructure, voice communication is offered as a service to remote tower controllers irrespective of their location using an ATM-grade network.

- With this cloud-like setup redundancy and contingency come built-in to the architecture for the Virtual Centre, as controllers can use the service from anywhere, and the service can run in any technical centre, irrespective of location.

- Remote tower voice communication services are fully integrated into the controllers workflow on the HMI – Supporting safe and intuitive handling of one or more remote virtual towers in parallel.