CONCEPT PAPER

The DAMM® Benefits of Distributed Critical Communication Architecture

DAMM

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Flexible system scaling

Distributed infrastructure for critical communication systems offers some major advantages over centralized solutions.

DAMM® systems are fully scalable, with no limitations, independent of the size of the network. The plug-and-play principle is effective in expanding network capacity to include more users, and in extending the coverage of the network itself, with a predicable CAPEX.

This makes it possible to scale and expand the system based on growing needs.

The IP-based technology platform gives full architectural network flexibility. You can increase capacity, extend network coverage or move capacity from one area to another, as required, even while the radio communications system is fully operational.

The DAMM IP-based platform connects all network components – including base stations, dispatchers, network management tools, external gateways and other applications – in one flat distributed IP architecture.

Distributed intelligence

DAMM TetraFlex® is a true distributed concept that enables easy and seamless scaling of networks.

All basic network functions are present in each node, and all nodes are equal in terms of capabilities.
All vital information are shared and replicated, and exists on all nodes in the entire network.

Adding a node to the network is thus also adding extra intelligence and processing power to the system, so there is no upper limit for expanding the system in terms of coverage or capacity.

Bandwidth efficiency

All communication in the TetraFlex backbone is based on IP.
Since each node is connected to the network via a router, only relevant data are forwarded.

Group and individual calls are distributed very efficient as multicast IP-traffic on a UDP-based protocol, with a minimum of data-overhead.

The propagation of multicast messages is similar to the nature of radio group calls:

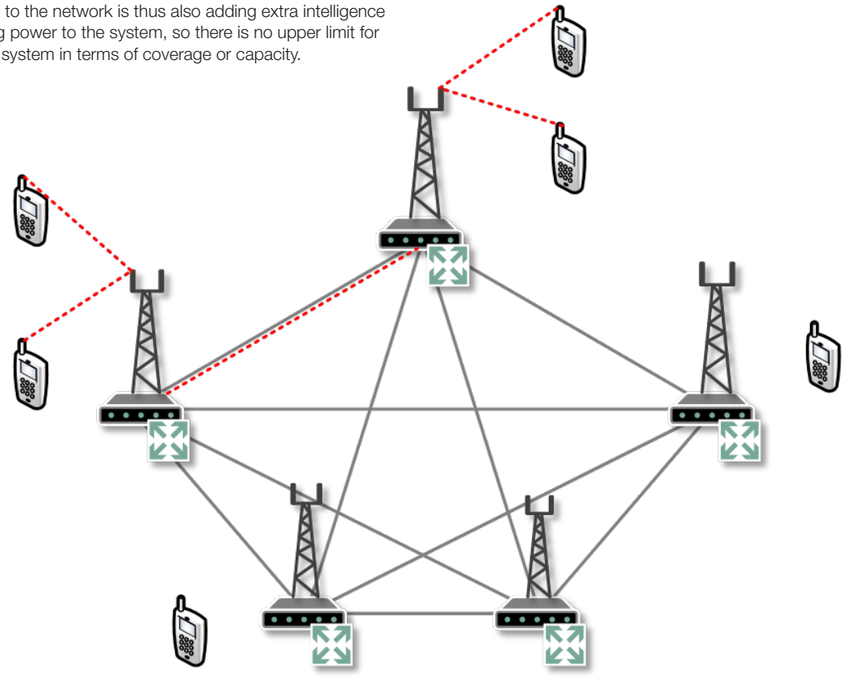
- Group calls are announced as multicast messages on the infrastructure.
- Each node will join this particular multicast group and receive the data, only if there are subscribers attached that belongs to this distinct group.
- When the call is ended the multicast groups are dissolved, until the next call is established.

It is important to note that the backbone traffic is only directed to the relevant nodes.

This peer-to-peer connection between nodes means that there is no back-haul to a central core requiring high capacity communication, and network load is distributed to the required branches only.

This also improves call set-up time significantly, as the decision on call-reply is made locally in the network.

The bandwidth requirements are very low, only 22 Kbit/s per timeslot for both upload and download. Only the actual timeslots in use consumes bandwidth.



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Benefits of Distributed Critical Communication Architecture

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Network Management in distributed systems

All system related information including the subscriber database is distributed to all nodes in the network. This means that they can be accessed from anywhere within the infrastructure using a single Network Management tool.

Any change to the system settings are being replicated throughout the entire system, but only the changes, keeping the network load to a minimum.

Software updates are also deployed from a single point and distributed to all nodes in the network.

System traffic-load is thus not increasing as a result of growing networks. The number of sites and subscribers are not limited by the system architecture.

Building fault tolerant networks

Due to the intelligent distributed network architecture, all system information is constantly
replicated to all sites in the network, eliminating any single point of failure. In this way, local call and data traffic will always continue uninterrupted, with all features intact, even if one or more local sites loses connection with the rest of the network.
This is also the case for encrypted traffic.

Distributed network topology also allows for building more robust networks, compared to traditional centralized networks with star topology.

Building networks in mesh-topology provides redundant paths through the network and the use of IP routers continuously optimizes routing paths through the infrastructure.

Because of the distributed intelligence at each node, this type of topology makes the system less sensitive to latency and jitter in the IP network. This makes it possible to use a variety of different network technologies, e.g. microwave and satellite links.

Features like gateways, voice and data logging can be installed on any radio node and distributed throughout the network. These features can be configured for redundancy, making it possible to have geographical independence of critical functions, increasing system availability.

Placing certain functions like, voice and data logging, at a central point, in a controlled environment like a server room, is of course also a possibility.

Network security

In all critical communication systems, security is key.

In addition to the strong build-in security features of TETRA like, Authentication and Air interface encryption distributed systems offers several solutions for adding additional security to the network.

The use of Generic Routing Encapsulation, in conjunction with IPsec Virtual Private Networks, ensures integrity of the infrastructure.

Security vital data such as key files and subscriber database are stored in encrypted form in the DAMM infrastructure.

As a further security feature, End-to-end encryption may be applied. This protects information as it passes through the system, both on the air interface as well as inside the infrastructure.

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