Inter-service Satellite Communication Network For Crisis Situations

The availability of information is becoming more and more essential for decision-makers on local and regional levels, not only in cases of crises or disaster, but also in the day-to-day operations of fire departments, police, and other aid organizations. The networking of existing data from various services is also indispensable for pro- viding the same information to all parties concerned in responding to an emergency.

ND SATCOM offers a joint SKYWAN satellite network, in which fire departments as well as task forces from other organizations can participate. Satellite transmission makes this network and its users independent of the current availability of terrestrial connections and ensures communication, even in the event of breakdowns or overloads (e.g., of the mobile network).
The SKYWAN network permits immediate communication in cases of need. On the other hand, no capacity is wasted when it is not required. This makes the network not only efficient, but also economical.

ADVANTAGES

- Increased reliability of critical communications links
- Constant availability without lengthy launching procedures in cases of use
- Suitable for use as an auxiliary (broadband) transmission medium in everyday operations
- Integration of various services (language, data, video, database access)
- Cost-efficient solution with operation in a multi-user network or a separate network
- Direct communication between vehicles and a fixed control center secured via optimized SKYWAN technology
- Communication independent of terrestrial or mobile networks
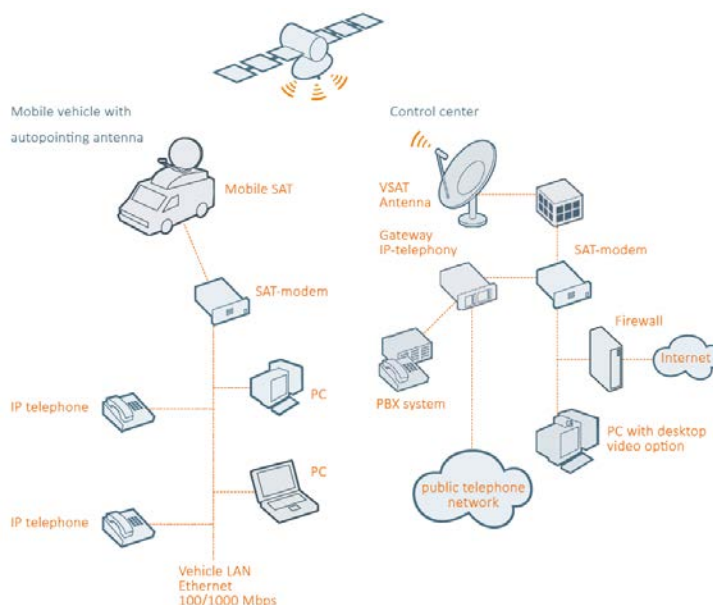- Interoperation with other governmental wireless networks

The network makes it possible to communicate independently via satellite, directly from the operation site to the operation center, and between several fixed and mobile locations, e.g., as a backup network or for remote monitoring. In mobile applications the crew can communicate with other services or databases, provide or use information, or telephone immediately on arrival, en route as well if needed.

SKYWAN systems technology also allows users to build a small, completely private and secure network.

NETWORK CORE ELEMENT

- SKYWAN satellite modem
- Built-in IP router
- Multiple LAN ports
- Data and telephony (VoIP)
- For communication with the fixed stations or other mobile stations
- Up to 20 Mbps in each direction
- File transfer, all-IP based applications

FOR AUTHORITIES AND ORGANIZATIONS WITH SECURITY RESPONSIBILITIES

- Police and Fire departments
- Crisis task forces (Federal Agency for Technical Relief, rescue services, and other aid organizations)
- Regional and interregional disaster control authorities

CONFIGURATION EXAMPLE

STATION TYPES for the control center
- **SKYWAN satellite modem**
- **fixed antenna and amplifier (as required per link budget)**
- **Optional VoIP Gateway**
- **Optional LTE EPC and gateway to Core Network**
- **Optional TETRA connectivity**
- **Optional WiFi cell**

STATION TYPES for deployable stations / temporary use
- **Transportable Terminals**
  - Range of quick deployable terminals from 60cm to 2.4m
  - Fully integrated Manpacks ready to attach PC or VoIP devices
  - Flyaway terminals with integrated EPC, designed for additional eNodeB mast with radio controller to build a LTE cell
- **Optional TETRA or GSM/LTE connectivity**
- **Optional LTE cell**
- **Optional WiFi cell**

STATION TYPES for the mobile stations (on-the-pause)
- **SKYWAN satellite modem**
- **SKYRAY Light mobile antenna**
  - 1.2m; Amplifier up to 40 W (as per link budget)
  - Automatic alignment with the satellite in a few minutes
  - Mountable on roof rails
- **Optional GSM/LTE connectivity**
- **Optional LTE cell**
- **Optional WiFi cell**

STATION TYPES for the mobile stations (on-the-move)
- **SKYWAN satellite modem**
- **SOTM mobile antenna**
  - Parabolic, flat or electronic steerable antenna
  - Permanent communication link via satellite
  - Mountable on roof rails
- **Optional GSM/LTE connectivity**
- **Optional LTE cell**
- **Optional WiFi cell**

ND SAT COM

SERVICES
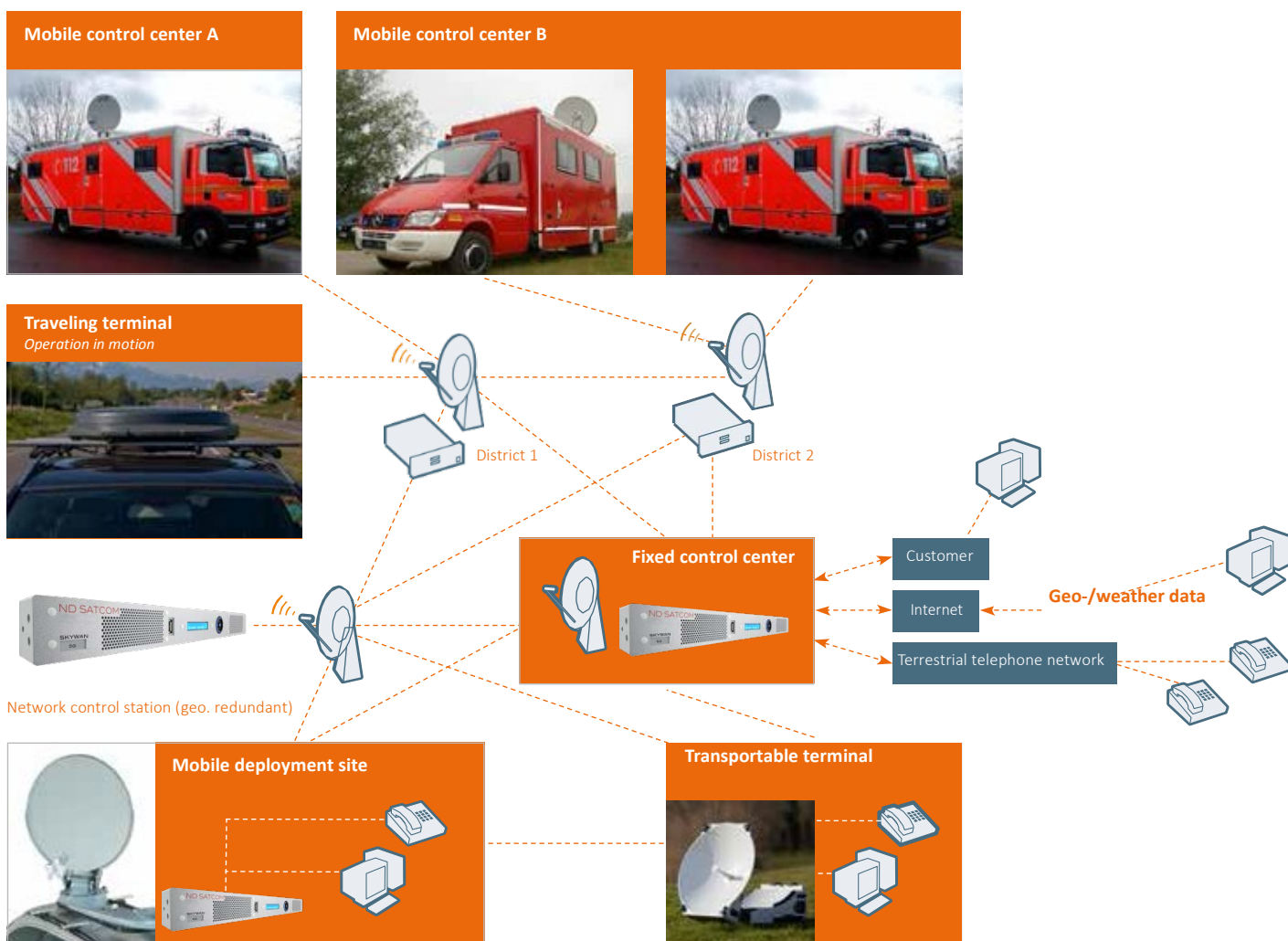
Services offered for voice and data communication:

- Voice: VoIP, GSM/LTE on request
- Data: IP, TCP, UDP, , database access, intranet, Internet
- Video conference, live image

On request, ND SATCOM integrates the system with existing devices in vehicles and control centers.

VIA SKYWAN

The satellite capacity used for the network is constantly available to all users and all locations and is redistributed every 100 msec based on the current demand. For these reasons, the maximum transmission bandwidth available for a given terminal varies. Video and voice are transmitted in real-time quality with a guaranteed throughput and guaranteed quality. If a terminal is not in the network (e.g., a car in the garage) it does not utilize any capacity which is available to other users. As soon as data traffic from local computers or servers reach the terminal, transmission capacity is automatically allocated to it.

Transportable and mobile stations can communicate directly with each other (via satellite) and access the Internet and telephone network via the „Fixed control center". The image illustrates a satellite communications network jointly used by several services.

Mobile control center A

Mobile control center B

Traveling terminal
Operation in motion

District 1

District 2

Fixed control center

Customer

Internet

Geo-/weather data

Terrestrial telephone network

Network control station (geo. redundant)

Mobile deployment site

Transportable terminal

ND SATCOM

Bundled with SKYWAN, ND SATCOM offers compact, stationary, transportable, and mobile ground stations, with which an organization can connect its sites' data networks, computers, servers, and telephone systems so that, in principle, any location can communicate directly with any other location via satellite ("mesh network"). In practice, this means that precisely those communications links required by an organization can obtain optimal support.

INTEGRATION WITH PUBLIC CELLULAR NETWORKS

In well-developed regions, the primary link may use GSM/LTE cellular networks to transmit traffic. In this scenario the mobile station is using a GSM/LTE device with SIM cards from the public network operator. However when that link is either not available, not reliable or the public cellular network is overloaded, the mobile stations automatically switches to satellite transmission.

INTEGRATION WITH TETRA NETWORKS

TETRA is a private wireless network offering narrowband voice and data services. Critical applications are Push-to-Talk and group communication. All these services are fully supported by the SKYWAN technology. TETRA voice quality over a satellite link is excellent; the fast allocation of bandwidth by SKYWAN matches Push-to-Talk requirements. Integration of a TETRA cell with a mobile or fixed station is via IP and seamless.

INTEGRATION WITH PRIVATE CELLULAR NETWORK

Governments or NGOs may require using a private cellular network infrastructure instead of a public cellular network. The ND SATCOM solution is based on standardized LTE cell equipment with a scalable eNodeB as part of its mobile stations plus the network element (Evolved Packet Core, EPC) to communicate with other nodes' EPCs to build a fully operational private cellular network. Such scenarios require frequency licenses assigned to the cellular private network, and may require to use specific end user handheld devices (special smart phones) using restricted i.e. non-public LTE frequencies. In addition to using secure private frequencies, the architecture of such a private cellular network is flexible to add mobile stations where communication needs increase or where existing fixed stationary cells failed.

Coupling a private cellular network with the public phone networks is simple by PBX gateways.

DYNAMIC NETWORK TOPOLOGY AND USAGE

Mobile stations either are used in an exercise or mission or are idle. Non-active stations do not waste critical satellite resources. Once activated the network will grow, the station may allocate resources and get connectivity and reachability information to all other stations that form a closed network group. The ND SATCOM SKYWAN technology provides secure satellite channels and dynamic routing to build any topology without need to configure the stations. No central planning or re-configuration in the heat of an operation is required.