Emergency Communication with Calling Frequency & Dispatcher

Peter Sidler – HB9PJT

GAREC 2012
Agenda

• Introduction of our Situation
  – USKA Sektion Zug and the Kanton of Zug
  – Scenarios
  – Technologies used

• Emergency Communication with Calling Frequency & Dispatcher
  – Used scenario and sample network
  – Objectives
  – How message exchange works

• Duty of the Dispatcher
  – Frequency-Station-Matrix
  – Station-Station-Matrix
  – Message exchange at dispatcher’s site
USKA Zug

- Regional Amateur Radio Club, 65 members
- Branch of the national USKA
- Emergency group team: 20 members
- Agreement with the local authority:
  → 10 members are operational after 1 hour
Kanton of Zug

Area: 239 km², popul.: 115,000, communities: 11
Scenarios

- Natural hazards:
  - landslide
  - flash flood
  - earthquake

- Other hazards:
  - airplain crash into a city
Technologies used

- Voice communication VHF/UHF FM (D-Star)
- 3 stationary and 2 portable repeaters
- Message forms
Technologies used

• HAMNET digital communication in construction
• Based on WIFI 5.8 GHz
• Link Range up to 30 km
• Line of sight required
• Up to 5 Mbit/s
Emergency Communication with Calling Frequency & Dispatcher

• How to organize the voice communication in a complex network?
• If there are 5 or more stations which have to communicate with each other?
Objectives

- Using more than one frequency for more throughput.
- Repeaters are rare and have to be used by several stations.
- Every station has to be reached reliable.
Required Structure

- Calling frequency
- Several message exchange frequencies
- Dispatcher
How it Works

• A station which has a message to transfer, calls the dispatcher and asks for the target station.
• The dispatcher does allocate a frequency to both stations.
• Both stations change to that frequency and exchange the message.
• After exchanging the messages, both stations come back to the calling frequency and report back to the dispatcher.
Duties of the Dispatcher

• He does coordinate the stations and frequencies.
• He has to know the net and must know which stations cannot communicate with each other directly and how to arrange a message via other stations (QSP).
• Maintain of a task list with all open tasks. If a station is not available for a QSO because it is exchanging messages, the dispatcher does originate the QSO between the two stations as soon as they are back on call the frequency.
Duties of Dispatcher (cont.)

- The dispatcher is always QRV on the calling frequency.
- The dispatcher never exchanges messages by himself.
- He does maintain a frequency/station-matrix so he always know what frequencies are occupied and on what frequency the stations are.
Frequency-Station-Matrix
simple

<table>
<thead>
<tr>
<th>CALL</th>
<th>Repeater 1</th>
<th>Repeater 2</th>
<th>QRG 3 simplex</th>
<th>QRG 4 simplex</th>
<th>QRG 5 simplex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station C</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station D</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Station E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station F</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Station G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

X = Mark occupied frequencies/stations by coins
If the Net Structure is Complex

• The dispatcher cannot hear all stations on the same frequency.
  → A second calling frequency is necessary.
  → A second TRX is necessary to listen to the second frequency at the same time.

• Some stations cannot QSO together.
  → QSP; message exchange over 3\textsuperscript{rd} station.
# Station-Station-Matrix

<table>
<thead>
<tr>
<th>CALL</th>
<th>Dispatcher</th>
<th>Repeater 1</th>
<th>Repeater 2</th>
<th>Station A</th>
<th>Station B</th>
<th>Station C</th>
<th>Station D</th>
<th>Station E</th>
<th>Station F</th>
<th>Station G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispatcher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeater 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeater 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Frequency-Station-Matrix complex

<table>
<thead>
<tr>
<th>CALL</th>
<th>Repeater 1</th>
<th>Repeater 2</th>
<th>QRG 3 simplex</th>
<th>QRG 4 simplex</th>
<th>QRG 5 simplex</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station C</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station D</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Station E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station F</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Station G</td>
<td></td>
<td></td>
<td>Via station C or F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

X = Mark occupied frequencies/stations by coins
Message Exchange at Dispatcher’s site

• A second operator is necessary to exchange the messages at the site of the dispatcher.

• Otherwise the dispatcher cannot comply with his duties:
  – Always be QRV on the calling frequency.
  – Never exchange messages on the calling frequency, if possible.