

Adaptation of real-time hydro-meteorological-rainfall monitoring networks related to Emilia Romagna region's RIRER network



The increase of intense and quick hydro-meteorological phenomena which increasingly affect our territory has led to the need for Arpae to collect more frequent monitoring data, in order to guarantee a more effective and timely control. For this reason, it has been decided to **update the real-time hydro-meteorological and climate monitoring networks** connected to the RIRER network of Emilia Romagna Region for Civil Protection purposes, which are managed by Arpae's Hydro-Meteo-Climate Service.

Summary

Location: Emilia-Romagna Region, Italy

Work completion: 2019

Focus: Hydrometeorological risk

Challenges:

- The increase of intense and quick hydro-meteorological phenomena
- Updating the real-time hydro-meteorological and climate monitoring networks connected to the RIRER network

CAE solutions:

- Reduce the cycle time of the hydrometeorological network to a maximum of 15 minutes
- Set up a dedicated UHF-band radio communication network
- Modulo radio RCS of CAE
- Upgrade the stations and control centres



FEATURES

The necessary operations have been carried out to reduce the **current cycle time** of all the radio-connected stations of the networks concerned, from 30 minutes to a maximum of 15 minutes.

For this purpose, a **single, dedicated UHF-band radio communication network has been set up**, which is completely centralised and managed by Arpae control centre in Bologna, guaranteeing **maximum simplicity and low running costs**. In case of fault at the main control centre in Bologna, Parma's Arpae control centre will be able to take over the entire network as a reserve control centre.

The **new network structure** consists of four sub-networks, operating in parallel, with transceiver systems for the transport backbone all at 9600 b/s. One of these subnets is exclusively dedicated to data exchange towards secondary centres and neighbouring networks.

This new network consists of pre-existing and new terminal devices, and of radio panels and digital repeaters of latest generation. During transmission, each repeater in the system is able to **automatically detect and correct any error on transmitted messages**, even if not directed to itself. This prevents degradation that is typical of long radio routes, reducing the risk of message corruption.

Finally, the system has undergone **significant technological development** and a **strengthening of the control stations**.



COMPOSITION

• RADIO

The project involved the adaptation of the existing monitoring network by replacing all the repeaters, repeating stations and radio panels, based on a 2400 b/s radio module with the new CAE's RCS model.

The communication protocols used are royalty-free and fully documented. CAE reconfigured the devices, in order to **reduce the cycle time** to 15 minutes, and to transfer the network management functions to the Arpae_RA-TETRA control centre in Bologna.

• STATIONS

The oldest Arpae_RA-UHF stations, have been updated to Mhas technology with **Open Log dataloggers**, based on **Linux open source operating system** with the highest level of system openness, able to manage applications in different risk contexts (**multi-hazard**).

• CONTROL CENTERS

The strengthening of the control panels has been achieved by supplying **redundant hardware**, along with implementing a **fully-virtualised architecture**. Moreover, in substitution of MERCURIO2, the new **DATALIFE** program has been installed and configured at Arpae's control centre in Bologna, complete with a new **Unified Data Base UDB** (SQL-based).

This will facilitate **automatic synchronisation** between the main and secondary control panels. The pre-existing data exchange procedures have been preserved for all the remaining stations, through the **maintenance of the procedures utilised by the existing ACTIVE.DVD** software, suitably reconfigured.

