# ES&S AWOS

## Airport Weather Observation System


### Integrated

ES&S Airport Weather System is an airport weather observing system for regional, national and international airports. The ES&S AWS measures, processes, stores, presents and communicates all meteorological data at the airport: measurements produced by variety of meteorological sensors, manual observations, WMO codes received from GTS and AFTN.

It provides the weather data to observers, air traffic control, pilots and other users in form of real-time screens, graphs, WMO codes, alarms and voice reports.

It interfaces upper air system, low level windshear alert system and radars.

The ES&S AWS conforms to all the ICAO and WMO recommendations regarding the measurements and reporting. It calculates various derived meteorological data such as QNH, QFE and Runway Visual Range, generates alarms, METAR, SPECI, SYNOP reports as well as national codes if required.

### Scalable and flexible

The configuration and structure of a respective Airport Weather System depends on the size, and category of the individual airport up to ICAO category CAT III. The modular architecture allows to expand from single Aviation Weather Display with basic set of sensors up to comprehensive systems for multi-runway airport connected to GTS and AFTN networks including a dual hot fail-over Central System, several Observer's Workstations, displays and terminals, briefings and ATIS/VOLMET services.

The well-prepared upgrade programs let the system follow technology progress and adapt to airport expansion and changes in regulations during its lifetime.

### Aviation Web Server

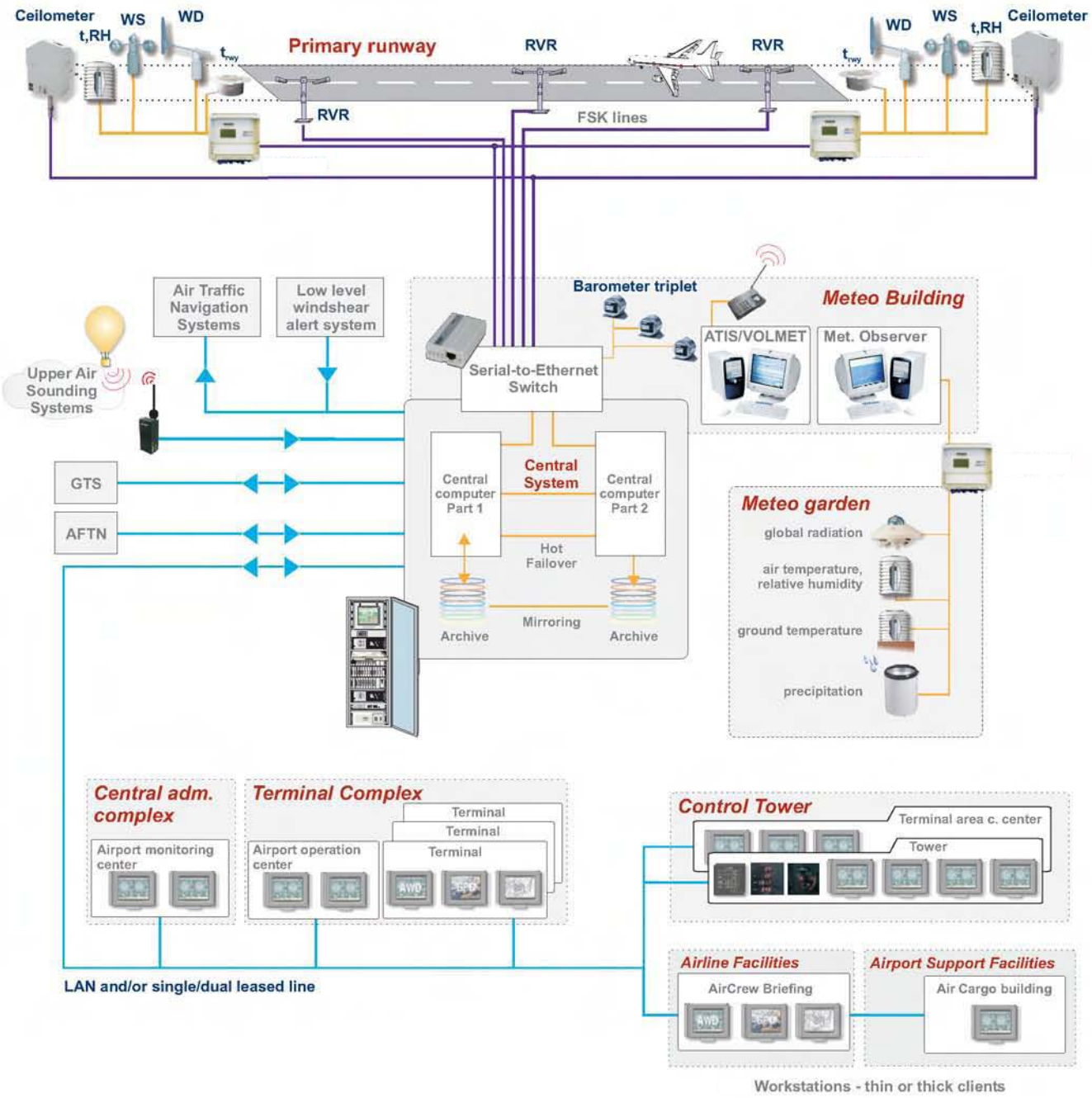
Within the same airport, or on the other continent, ES&S AWOS provides the users with the powerful and efficient web interface.

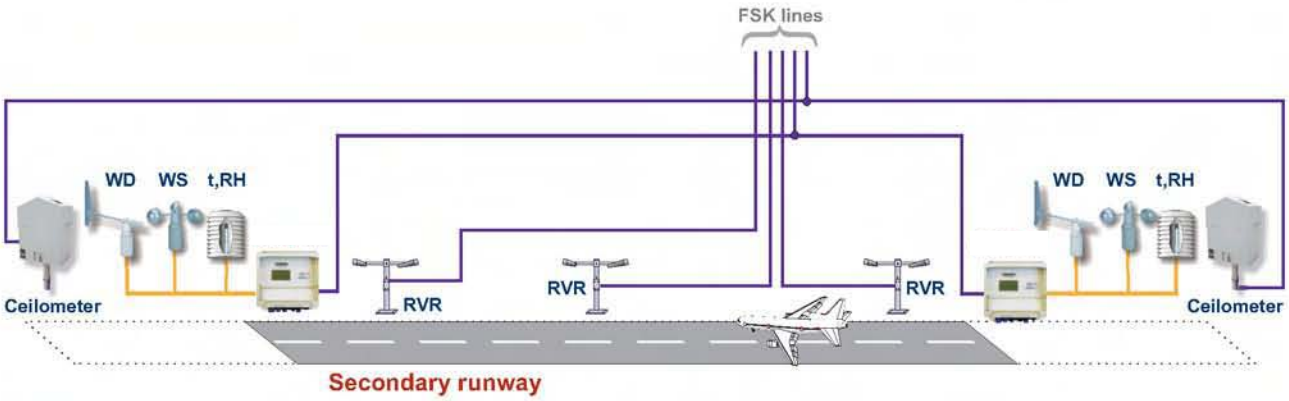
All the user needs in order to view the AWOS data is a standard web browser and Internet connection.

# Airport Weather Observation System

*system layout*

## Large ES&S Airport Weather System



# Airport Weather Observation System

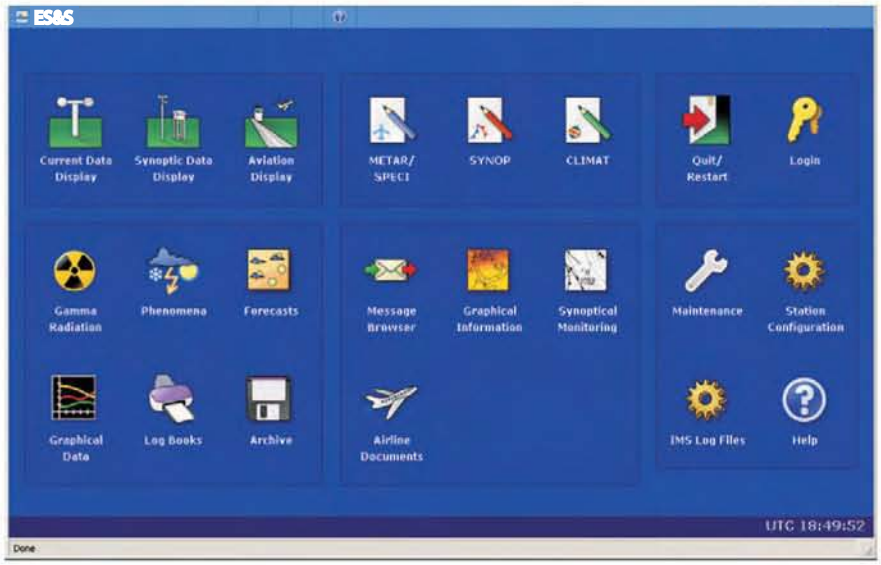
*system description*

## Measurement

The system can interface numerous types of loggers and sensors. It is designed to measure, calculate and process different meteorological quantities as temperature (dry, surface, soil, soil under vegetation), wind speed and direction, pressure (station, QNH, QFE, QFF), relative humidity, precipitation (indicator and amount), runway surface temperature, runway condition (dry/damp/wet/ice,etc.), visibility and RVR, cloud height, sunshine duration, solar and gamma radiation, visibility, evaporation, $O_3$ concentration and is open to adjust for measuring and processing of other quantities, if needed.

The measurement module offers:

- Interfaces to the various sensors and dataloggers: RS232 / RS422 / RS485, TCP/IP (http, ftp and telnet protocols)
- Data collection based on TCP/IP network and/or RS lines, radio, USB
- Numerous input data formats supported (raw text/binary, XML), data input based on Plain2XML convertors
- Quality control, verification of measured data, format validation




## Reporting

The ES&S AWOS sends and receives and presents the data on the Internet/Intranet data in the form of meteorological messages via the GTS and/or AFTN network. The system supports creating of standard WMO codes SYNOP, METAR, SPECI, CLIMAT and it is open for other national messages.

- Data processing based on XML and JEP technologies.
- Data archiving based on XML2SQL bridge.
- Data 2D/3D presentation and manipulation
- Automatic/manual creating of standard SYNOP, METAR, SPECI, CLIMAT, SIGMET, TAF, AIRMET, GAMET messages and national code forms with data verification.
- Data distribution within GTS network.
- Distributed programming based on Java Web Services.
- Meteorological charts and radar pictures processing, display and printing (T4, BUFR, GRIB).
- Data export to various formats (ASCII, XML, log files, Microsoft® Office formats)

## Alarms

AWOS allows to configure rich set of alarms including:

- Diagnostics of datalogger and sensor errors.
- Quality control of measured data (limits, internal consistency).
- Operational alarms (user-defined thresholds and limits).
- Communication errors.

## Configuration

The user-friendly interface enables configuring the AWOS software to meet the requirements of many different applications, ranging from small airports to CAT III airports with dozens of sensors and communication lines.

- Customization based on XML configuration files
- Station metadata
- Datalogger and sensor parameters
- Input/Output telegram formats
- Communication line setup
- Alarms and security settings
- Customization of the Web applications

# Airport Weather Observation System

*system components*

## Field sensors

The typical set of ES&S AWS field sensors consists of:

- Wind speed and direction sensors
- Pressure sensors
- Temperature and humidity sensors
- Visibility sensors (transmissiometers, forward scatters)
- Cloud height sensors
- Weather station with rain gauge, global radiation, ground temperature and other sensors
- Present weather sensor, thunderstorm/lightning sensor
- Runway surface sensors

In addition to the standard set of sensors used with IMS AWS system, any sensor can be interfaced either by the weather station or by the Central System. Communication with the sensor is implemented using copper wire, fibre optic or radiomodems.

## Central System

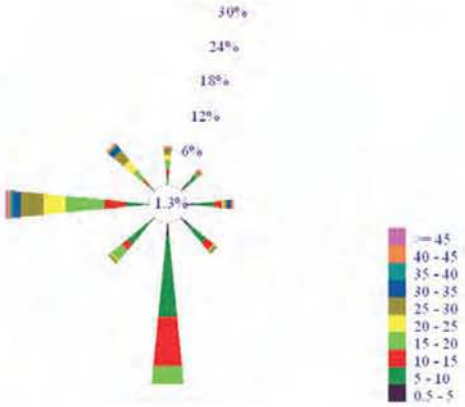
The reliability is essential for the airport weather observing system. In addition to redundancy within a computer (mirrored disks, duplicated power supplies, network card), the ES&S AWS includes Central System - dual hot-fail over system designed for airports where uninterrupted operation and hot backup are demanded.

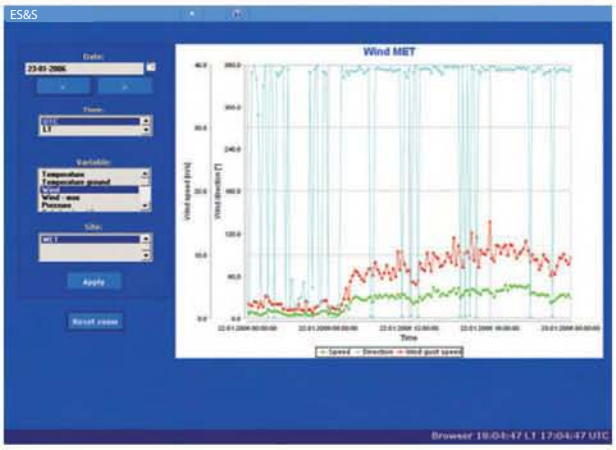
The Central System is used as a central node for all communication networks and interconnects field sensors, displays and individual IMS-based stations installed on the airport, thus enabling to backup these networks.

The Central System makes all preprocessed data available to IMS Workstations and remote displays, thick or thin clients.

## Observer's Workstation

Observer's Workstation supports all processes related to collection of local meteorological data on an airport - especially creation and usage of the meteorological messages, namely of the SYNOP, METAR and SPECI.




## Forecasting Workstation

Forecasting Workstation supports all processes related to making forecasts based on local meteorological data. It mainly supports creation and utilization of meteorological messages as TAF, LONG TAF, WARNING, SIGMET, NOTAM, GAMET, regional QNH and various forecasts for locations and routes. The Observer's and Forecasting workstations backup their functionality.

## Data Displays (LED)

Data Displays provide fixed data views (wind, pressure, cloudbase, RVR or other data).

# Airport Weather Observation System

*system components*

## Aviation Weather Displays (LCD)

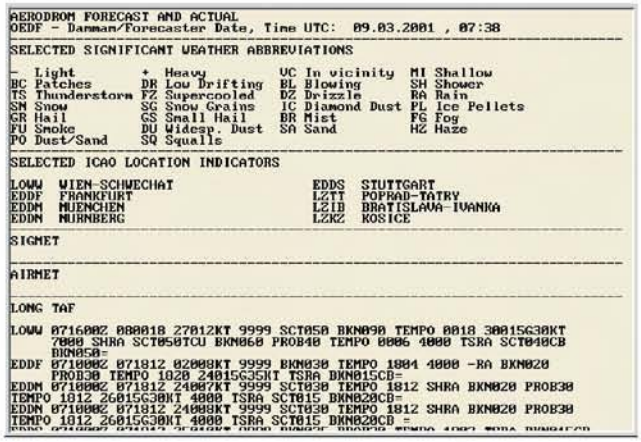
Aviation Weather Display serves for operators at tower, approach, operations and other places where real-time screen containing local measured data and selected information from national bulletins is necessary to be permanently displayed.

## Briefing

Optional Briefing Workstation subsystem provides collecting and printing of flight documentation for pilots based on the local meteorological data and messages received from the GTS, AFTN, SADIS, WAFC FTP backup:

- OPMET text data as the METAR, SPECI, TAF, LONG TAF, WARNING, SIGMET, AIRMET and various forecasts for locations and routes.
- SYNOP messages, NOTAM messages.
- wind, temperature, humidity, pressure etc. charts from GRIBs.
- significant weather charts (medium and high levels) from BUFRs.
- binary messages as the T4 charts, radar BUFR94 pictures and NOAA satellite pictures.
- current weather, locally measured and observed.

The user can easily collect and print all necessary flight documentation containing the local conditions, conditions at the target and along the flight route. Having once defined a route in the system, the IMS Briefing can master this task only in a few seconds. The IMS Briefing handles automatically validity of all data.



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AERODROM FORECAST AND ACTUAL
OEDF - Dammam/Forecaster Date, Time UTC:  09.03.2001 , 07:38
-----------------------------------------------------------------------------
SELECTED SIGNIFICANT WEATHER ABBREVIATIONS
-----------------------------------------------------------------------------
-  Light          +  Heavy          VC In vicinity  MI Shallow
BC Patches        DR Low Drifting   BL Blowing      SH Shower
TS Thunderstorm   FZ Supercooled    DZ Drizzle      RA Rain
SM Snow           SG Snow Grains    IC Diamond Dust PL Ice Pellets
GR Hail           GS Small Hail     BR Mist         FG Fog
FU Smoke          DU Widesp. Dust   SA Sand         HZ Haze
PO Dust/Sand      SQ Squalls
-----------------------------------------------------------------------------
SELECTED ICAO LOCATION INDICATORS
-----------------------------------------------------------------------------
LOWW  WIEN-SCHWECHAT                  EDDS  STUTTGART
EDDF  FRANKFURT                       LZTT  POPRAD-TATRY
EDDM  MUENCHEN                        LZIB  BRATISLAVA-IVANKA
EDDN  NURNBERG                        LZKZ  KOSICE
-----------------------------------------------------------------------------
SIGMET
-----------------------------------------------------------------------------
AIRMET
-----------------------------------------------------------------------------
LONG TAF
LOWW 071600Z 080018 27012KT 9999 SCT050 BKN090 TEMPO 0018 30015G30KT
     7000 SHRA SCT050TCU BKN060 PROB40 TEMPO 0006 4000 TSRA SCT040CB
     BKN050=
EDDF 071000Z 071812 02008KT 9999 BKN030 TEMPO 1804 4000 -RA BKN020
     PROB30 TEMPO 1020 24015G35KT TSRA BKN015CB=
EDDM 071000Z 071812 24007KT 9999 SCT030 TEMPO 1812 SHRA BKN020 PROB30
TEMPO 1012 26015G30KT 4000 TSRA SCT015 BKN020CB=
EDDN 071000Z 071812 24008KT 9999 SCT030 TEMPO 1812 SHRA BKN020 PROB30
TEMPO 1012 26015G30KT 4000 TSRA SCT015 BKN020CB =
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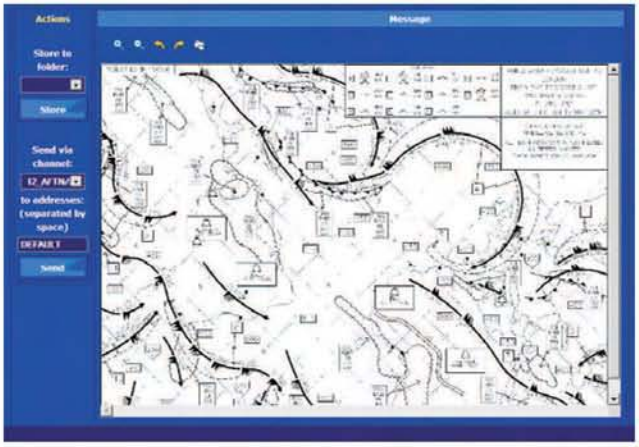
## Graphic Presentation Display

Graphic Presentation Display is designed to present user-configured sequences of images received in form of binary messages from the GTS network or systems like the SADIS or METPRO.




## Service PC

Maintenance terminal is designed to control network of automatic stations and IMS workstations. It provides monitoring of operation, upgrading and other support for the installed systems.

## Remote Maintenance

All AWOS systems have full remote maintenance capabilities including download of measured data, maintenance of the sensors and dataloggers and software upgrade.

## Easy-to-use

Graphic user interface is based on web applications. Thus it is easy to use for any user familiar with Internet.

## Compliance with standards

- CAA Certified (Type approval, applicable standards)
- ICAO Annex 3 and 10 for Data Processing and Reporting Practices
- ICAO Annex 14 Aerodrome Design and Operations
- ICAO Doc 8896 for Aeronautical Meteorological Practices
- ICAO Doc 9328 for RVR Observing and Reporting Practices
- WMO No 306, Manual on codes
- WMO No 386, Manual on GTS
- ISO9001:2008 for quality assurance