jetvision®

Product Overview

Radarcape

Professional ADS-B and MLAT Receiver

jetvision GmbH - Am Rain 24 - 85256 Vierkirchen - Germany

Radarcape ADS-B MLAT Receiver

Radarcape is a professional ADS-B receiver made for 24/7 operation. High performance reception in a wide temperature range, suitable for all applications in wide area, surface or apron monitoring. Radarcape comes with optional features for special applications (see table below) and is proven in thousands of client environments worldwide.

Radarcape offers high quality RF performance and a large reception range with high accuracy, a state of the art Linux based firmware and low power consumption. The precision GPS based time stamp is available, and the device can also operate as a Stratum-1 time server. The 50ns deviation timestamp is perfect for Multilateration calculations performed in Jetvision MLAT networks.

Designed as all built-in ADS-B receiver, there is no need for external software. **Radarcape** can operate as stand-alone device with multi user web browser access. All users have their own settings, filters etc., regardless of access by desktop, tablet or smartphone. Many status and performance pages support and supervise installation and operation.

For individual applications **Radarcape** can provide live tracking data to its data interfaces (see decoded formats in the aircraft data output table below). Separately available options provide Eurocontrol ASTERIX protocol with CAT021, CAT023 and CAT247 based on EUROCAE ED129-B.

Radarcape is the basic ADS-B and MLAT receiver for jetvison commercial solutions e.g. Out- and Indoor or Mobile Sensor Stations.

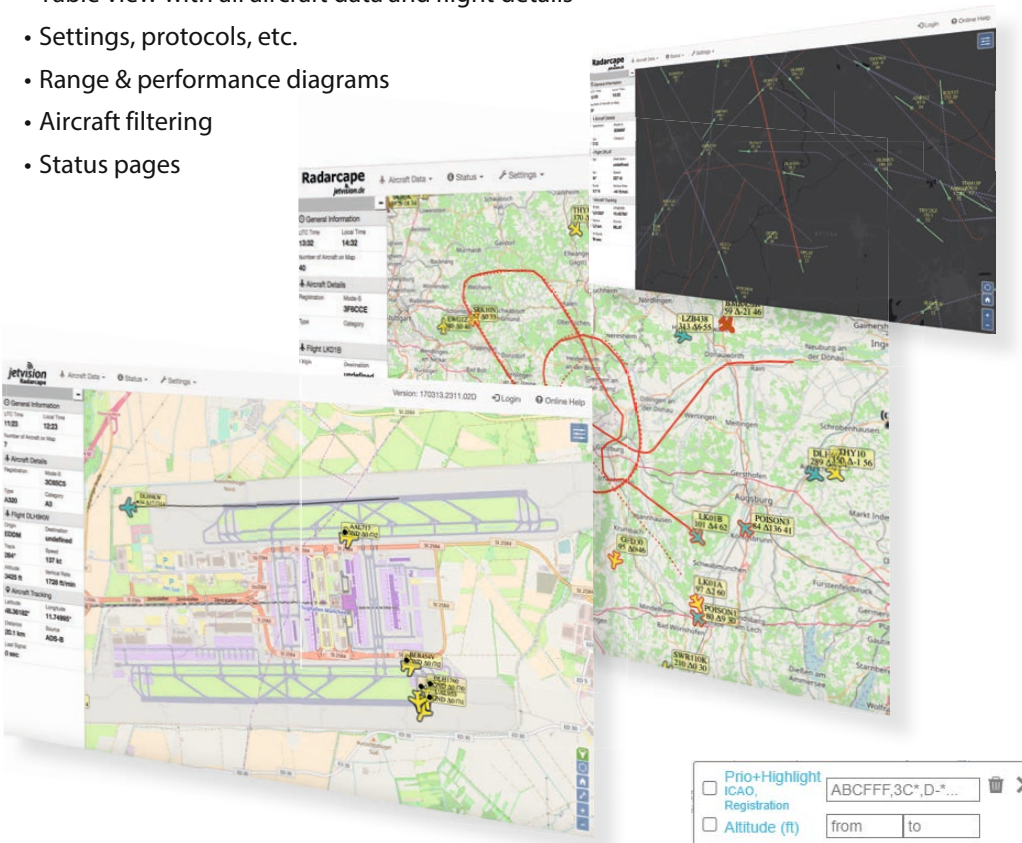
Conclusion:

As a powerful ADS-B receiver **Radarcape** will support all your requirements for live flight tracking. Stand-alone or in a complex network with MLAT server support, under challenging RF conditions available with optional features like real antenna diversity, high dynamic range at apron or close to the runway.

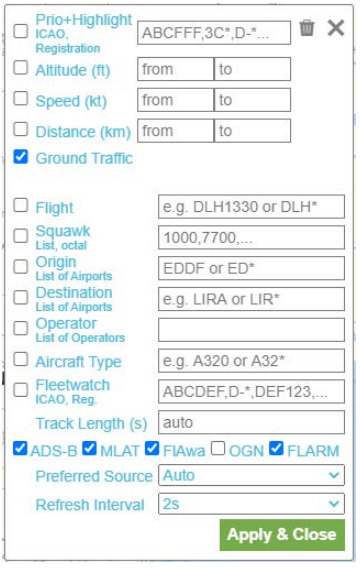
Web Browser User Interface

(powered by Radarcape)

- Different map styles including ATC and OpenLayers
- Table view with all aircraft data and flight details
- Settings, protocols, etc.
- Range & performance diagrams
- Aircraft filtering
- Status pages



With its versatile filter functions each client can setup and filter various conditions including:



- Center screen to home location
- Keep selected aircraft in the center of the map
- Filter on altitude, speed, distance...
- Filter on flight, aircraft type, fleet watch
- Select data source e.g. ADS-B, MLAT, FLARM, OGN
- Setup track length, refresh interval
- SQUAWK

Radarcape Technical Data

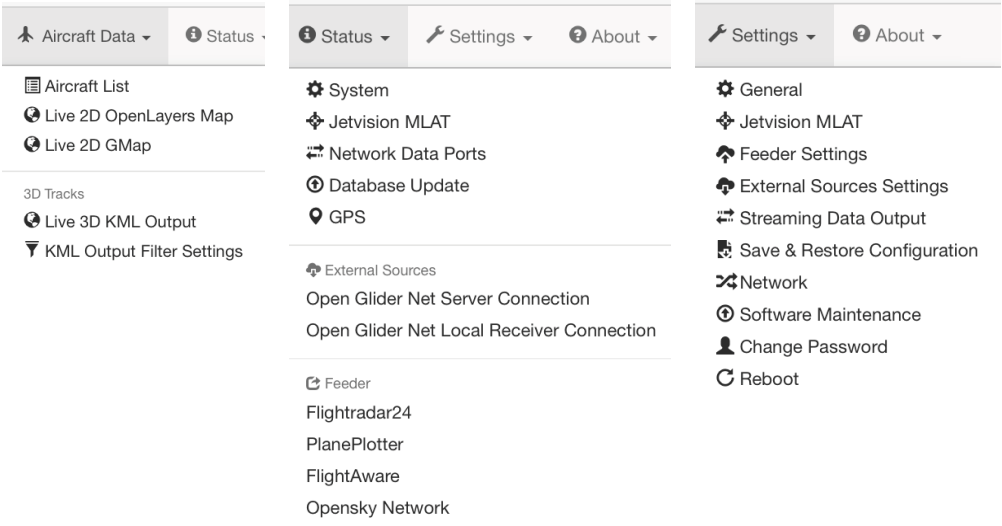
Radarcape Hardware	
Trimble Resolution SMT GPS module	GPS localisation and timestamps with a resolution better than **50 ns 1σ** (15 m)
Linux Core	AM335x 1 GHz ARM Cortex-A8 512 MB DDR2 RAM, 4 GB eMMC USB host port, USB device port
Sensitivity	-93 dBm signal level for 50 % decoding rate or better
Decoding	FPGA based decoding
USB expansion port	SDR sticks, measurement devices, data storage systems, WiFi stick
Temperature range	Tried and tested in a wide temperature range
Power	Low power consumption, typical 3 W (external power supply)
Extensions	Open design for customer extensions
Hardware options	• Antenna diversity (2 seperate RF units) • High Dynamic Range (HDR) • Video out (ADS-B analog signal) • External clock input (10 MHz)
Aircraft Data Output	
Raw Mode-S data	• Non-decoded raw data available for formats DF-0, DF-4, DF5, DF-11, DF-17, DF-18, DF-20 and DF-21 • AVR hexdump or Beast-Binary formats • 12 MHz counter legacy timestamp or GPS based absolute timestamps
Decoded data formats	• Port 30003 CSV style format • JSON format • Eurocontrol ASTERIX CAT 021, 023, 247, licensed seperately • HTML web GUI • KML format
Decoded information	• Aircraft data: ICAO hex code • Flight parameters: location, altitude, speed, track, vertical rate • Flight ID, Squawk • BDS registers (partly) • Signal level ... and many more
Accessibility	• TCP connection • UDP streaming • USB VCP serial interface • USB RNDIS network

Remark:
Jetvision MLAT server supports the same data interfaces structures as Radarcape, integrating results from multiple sensors.

Radarcape Software Features

Firmware - Integrated Webserver	
Decoding	High performance FPGA based decoding (Mode-S, ADS-B and Mode-A/C data on 1090 MHz)
Operating system	Linux Debian 10 operating system
User interface	Web browser access with web interface (built-in webserver, compatible with all common browsers, responsive design)
Map styles	Real time flight tracking in 2D map view (ATC or OpenLayers Maps style)
Table style	Real time flight table update
Multilateration	MLAT via jetvision network
Feeder	Multiple built-in feeder options (Flightradar24, FlightAware, Opensky Network, PlanePlotter, ADS-B Exchange)
FLARM®	External FLARM® receiver connectable by LAN or Micro-USB
Open Glider Network (OGN)	Aircrafts tracked by OGN network can be displayed
Network interfaces	Multiple network interfaces (TCP, UDP, USB-VCP, USB-RNDIS)
Data formats	Multiple pre-decoded and raw data output formats (JSON, ASTERIX, CSV, KML, Port 30003, raw data)
Time server	Stratum 1 NTP server

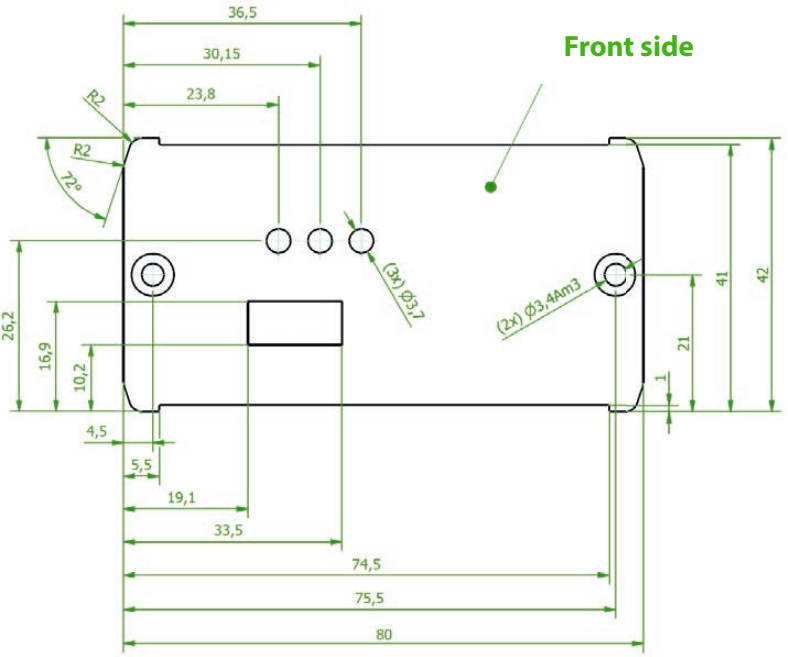
Powerful Software Options



Radarcape Basics

Radarcape Basic Data	
Power	5 V external power supply, 5.5/2.1 mm DC connector
Dimensions	92 x 80 x 45 mm (L x W x H)
Weight	300 g
CE and FCC certified	CEE and FCC
ROHS conform	Yes

Radarcape Delivery Includes	
Radarcape	Hardware options must be ordered separately
Power supply (5 V)	4 types of wall plugs: EU/ US/ Australia/ UK shipped according to destination country
Network cable	5 m, CAT-5
GPS antenna	Cable length 5 m, extension 5 m and 10 m available
Commercial Options	Asterix CAT 021, Ed. 0.23/0.26/2.4, CAT 023, CAT 025, CAT 247 MLAT configuration fully flexible



Radarcape Antenna Diversity (optionally)

Using the Radarcape two channel (2CH) option (Fig.1) provides best results in difficult surroundings. Many problems can be solved, e.g. a favorite direction to observe a hot spot (Fig.2), antenna on a tower with blocking view (Fig.3) or a directional / long range extension (Fig.4).

Fig.1

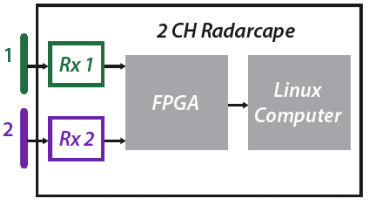


Fig.2

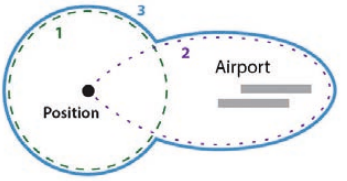


Fig.3

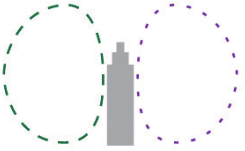
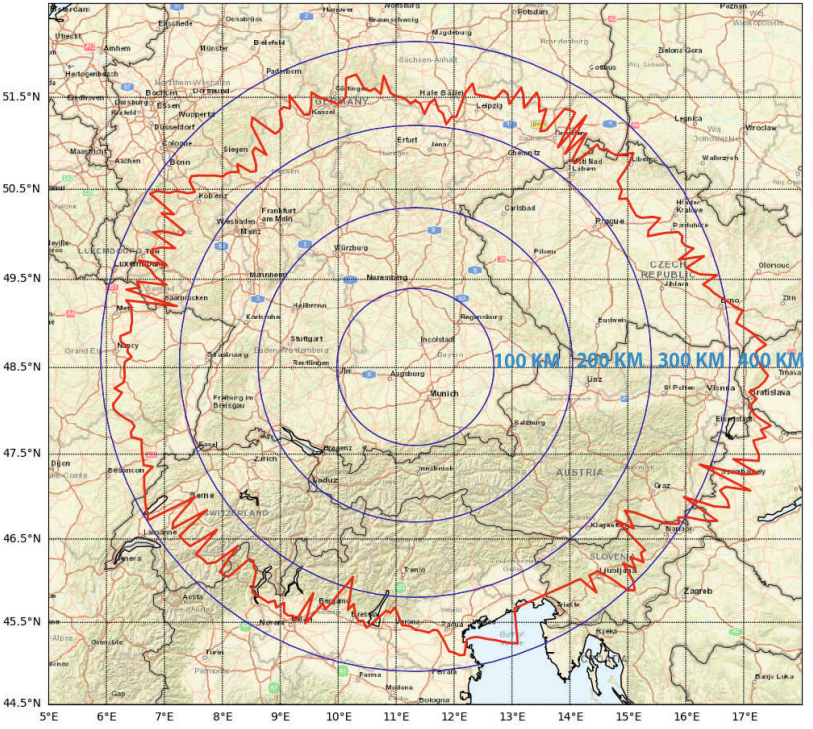


Fig.4

Radarcape 2CH with YAGI antenne direction 110 degrees
(Munich airport) - Range > 400Km



Radarcape Type Comparison

Check out all avaiable Radarcape options:

Jetvision Radarcapes Type Overview	See Note	Article Number	RF Units	Antenna Inputs	GPS Module	Video Output	External 10MHz Reference + 1PPS
Radarcape		66006	1	1	•		
Radarcape High Dynamic Range (HDR)	(1)	66006HDR	2	1	•		
Radarcape Antenna Diversity (2CH)	(2)	66006D	2	2	•		
Radarcape Video Out	(3)	66006V	1	1	•	•	
Radarcape 2CH + Video Out	(2, 3)	66006DV	2	2	•	•	
Radarcape Video Out + ext.Clock + 1PPS	(3, 4)	66006VC	1	1		•	•
Radarcape 2CH + Video Out + ext. Clock + 1PPS	(2, 3, 4)	66006DVC	2	2		•	•

Notes:

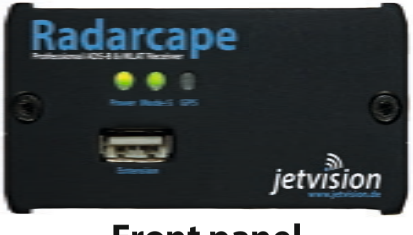
(1) For applications with aircraft closer than 300m to the antenna.

(2) Antenna diversity. 2 RF channels with two antennas. For complex situations e.g. reflections, one priority direction (with Yagi antenna) etc.

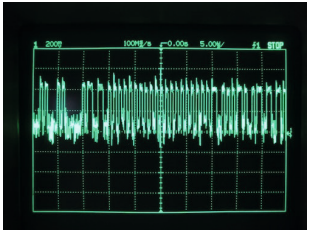
(3) Video out: SMB connector with video out signal to check signal quality.

(4) 10 MHz clock input: External 10 MHz reference clock and 1PPS input for a reference clock-based environment.

(5) Wifi with external Wifistick



Front panel



Video out

Rear panel

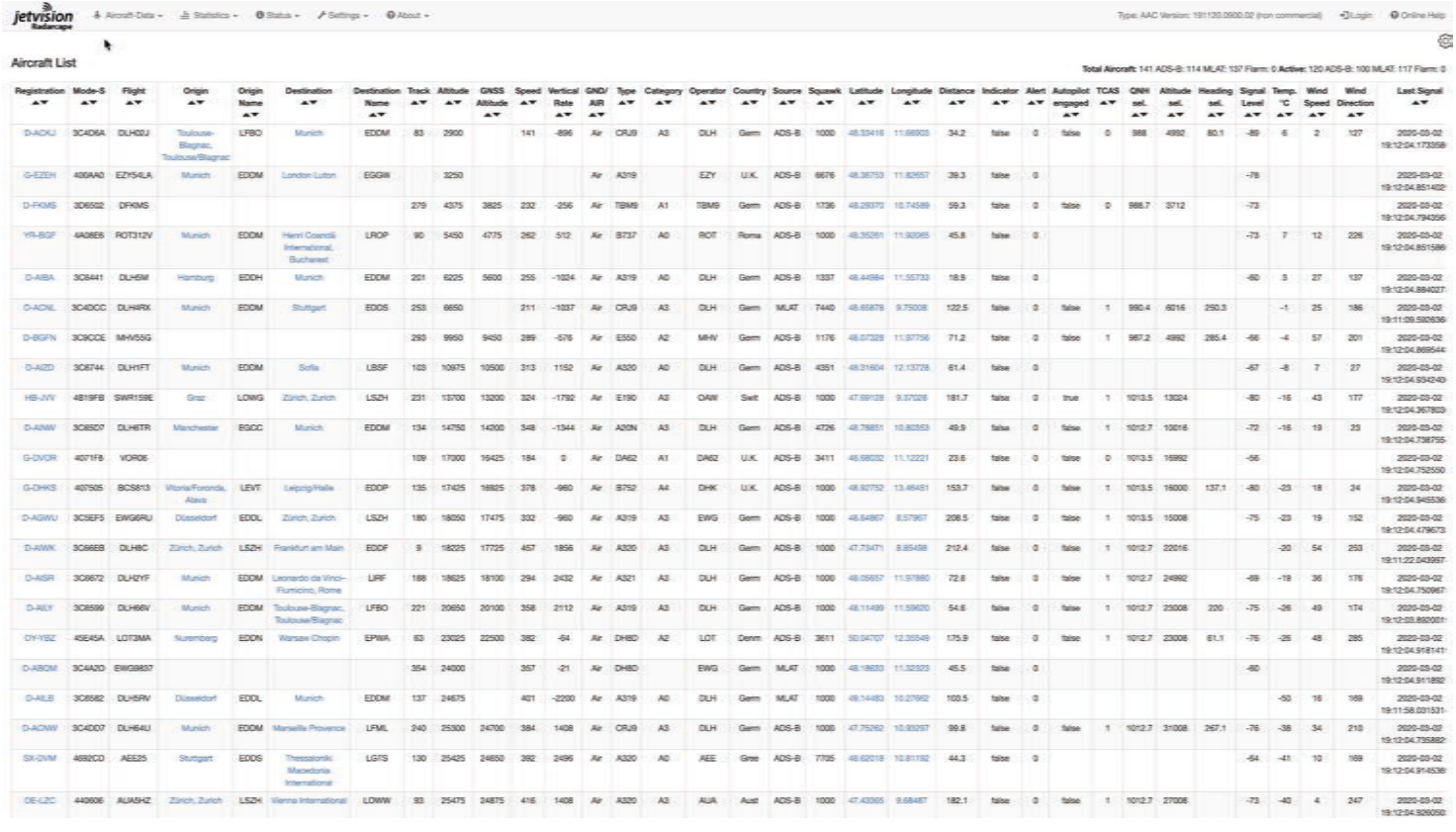
Diversity with Video Out

CPU

Cape

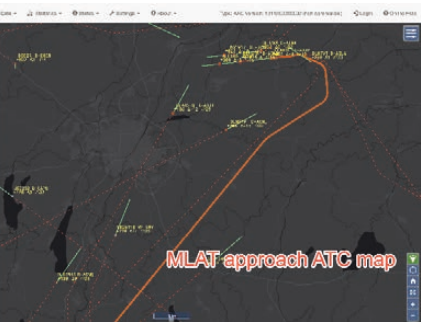
ADS-B Demodulator

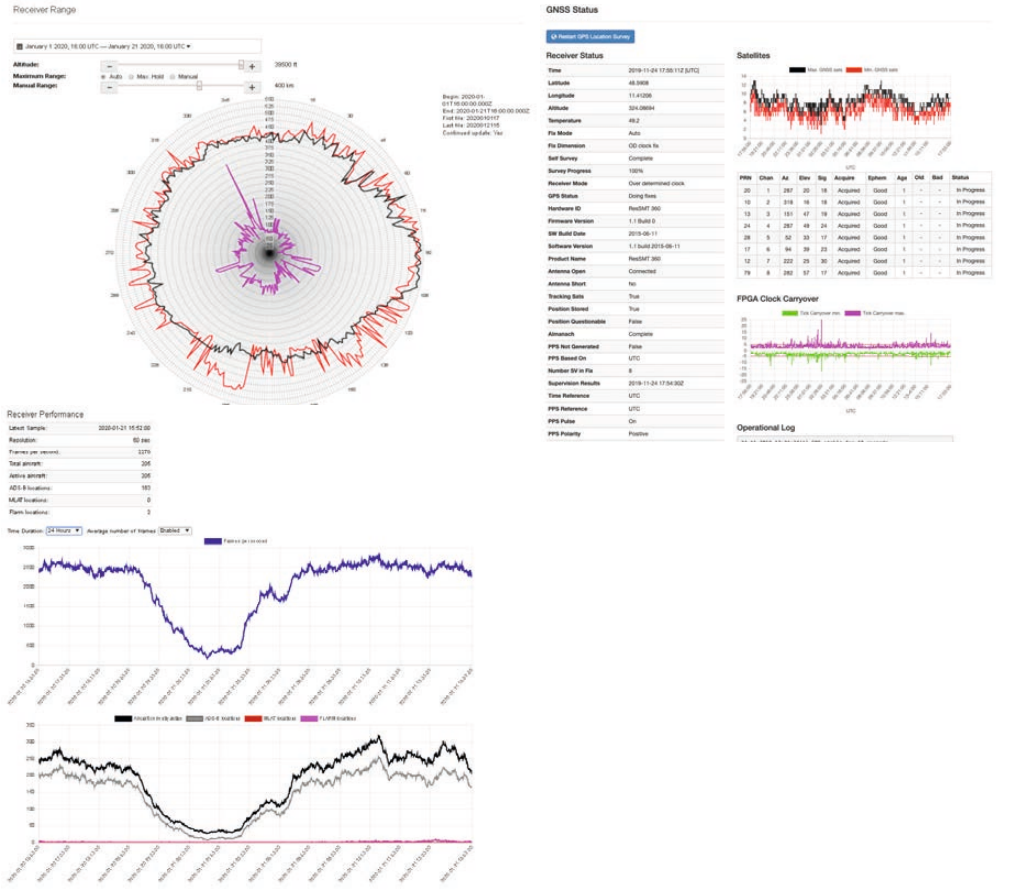
Aircraft List



Columns are configurable. You can directly jump to positions within map.

Radarcape Screenshots

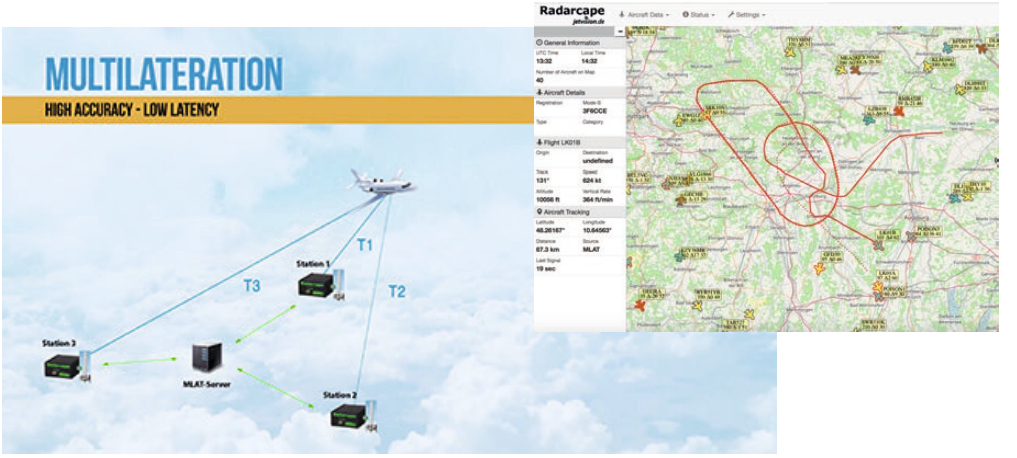




Radarcape Accessories

Antennas and Filter		
Antennas 1090 MHz	**A3 ADS-B Antenna**	**A3 ADS-B Antenna - V4A offshore**
	Premium A3 ADS-B antenna with high gain (+5 dBi) for frequency range of 1090 MHz including antenna mount. N-female-connector Suitable for installations with short to medium length antenna cables or when using low loss cables. Our antenna is best suitable for outdoor use.	This ADS-B antenna (V4A stainless special steel) is suitable for off-shore use and includes mounting kit. N-female-connector SCO-1090-MO certified MIL-STD-810G, method 509.5 (48/48h). This passive antenna has high gain (+5 dBi). Suitable for installations with short to medium length antenna cables or when using low loss cables.
	Active Diapason Antenna	
	Active high performance ADS-B Antenna 1090 MHz with 2 dBi gain, noise figure typ. < 1dB, LNA amplifier , app. 21 dB gain. SMA-connector For distant antenna locations to compensate for associated cable losses.	
Filter	**1090 MHz Cavity Filter**	
	1090 MHz 3 Pole Filter, 2x SMA-female or SMA/N-female. A filter with high quality and low attenuation. Recommended in close proximity to high power GSM, FM or TV stations. Massive DC short on input and output for static electricity and lightning protection. Passband Attenuation: **only 0.5 dB.** Bandwidth (-3 dB): better than 9 MHz	

Multilateration



Client Requirements	
Accessibility	Port 10011 must be open for both TCP and UDP from Radarcape to the server
Firewalls on Radarcape side	In most cases, firewalls don't need special configuration (like DSL Fritz-Box, Speedport etc.)
GPS	GPS antenna must be installed and have a free sky view
Location	MLAT processing for aircraft within a region with minimum of three Radarcapes or by participating in jetvision MLAT network

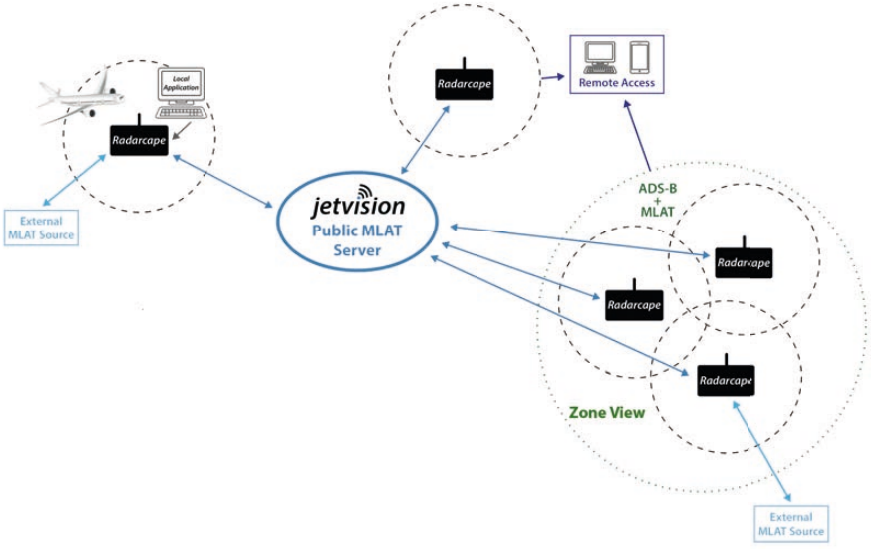
jetvision MLAT Server	
Sensor data fusion	All data formats that are supported by a Radarcape sensor are available from the MLAT server as aggregation of all connected sensors
Monitoring and maintenance	• Connected clients • Client performance supervision • Currently tracked aircraft (summary of all clients)

Further information about jetvision MLAT server can be found in our product brochure „Multilateration".

Jetvision Flight Tracking Network

Every Radarcape will by default join the jetvision flight tracking network in order to enjoy features like remote access, sharing groups or multilateration (for areas where a sufficient number of stations are part of the network). Privately operated customer networks can be established by jetvision as a seperate service. If strict privacy is required, On-Premise licenses and support for local MLAT server operations are available.

These features are licensed separately for commercial users. See also our terms and conditions on www.jetvision.de. For more information about licensing, options and special requirements, please contact: support@jetvision.de



Features Jetvision Flight Tracking Network	
Tracking data	Access to realtime tracking data including MLAT data
Grouping	Closed user groups
Remote access	For private groups using jetvision MLAT service
MLAT	• starting with three ADS-B receivers for a common area only • also available for ADS-B aircraft
Commercial options	Group View • Operate a private flight tracking network on jetvision server, including MLAT for all connected sensors, complemented with all sensor data in jetvision cloud sourced network • Archive all flight tracking data for later reviews • Individual functions on request Zone View • for a defined region, combining customer and cloud sensor data

jetvision Receiver World

for professional live flight tracking

Radarcape

Air!Squitter

Outdoor Sensor Station GFK

Indoor Sensor Station

Indoor Sensor Station (small)

Mobile Sensor Stations

Feature List:
ADS-B
Multilateration (MLAT)
FLARM
GSM (LTE data link)

MLAT server connectivity

Customized configurations
Industrial quality

jetvision GmbH
Am Rain 24
85256 Vierkirchen - Germany
support@jetvision.de
www.jetvision.de

ISO 9001 certified supplier

Cable up to 30m: Passive ADS-B Antenna

#66903:
magnetic mounted GPS antenna
with 5m cable
#66913:
magnetic mounted GPS antenna
with 50cm cable
#66914:
Outdoor GPS Antenna

GPS Antenna

A3 Antenna

#67020:
Omni directional antenna
Gain: 5dBi
Size: 625mm long

#67305:
V4A quality

for 66903/66913:
5m extension: #77505
10m extension: #77510

for #66914:
5m: 70305
10m: 70310
and so on in 5m steps

Radarcape

#66006:
Radarcape
Power Supply
LAN cable
Magn. GPS Antenna

optional: Pigtail
for H2000 pull relief

#70251:
10cm SMA-F/SMA-M

Coax Cable

Constraint: Less than 4dB attenuation

Standard
CO100AF:
5m: #70405
10m: #70410
15m: #70415

Robust
H2000 flex:
5m: #70705
10m: #70710
15m: #70715
20m: #70720
25m: #70725
30m: #70730

Hyperflex 5
5m: #70905
10m: #70910
15m: #70915

Cable more than 30m: Active Diapason Antenna

#66903:
magnetic mounted GPS antenna
SMB, 5m cable
#66913:
magnetic mounted GPS antenna
SMB, 50cm cable
#66914:
Outdoor GPS Antenna

for 66903/66913:
5m extension: #77505
10m extension: #77510

for 66914:
5m: 70305
10m: 70310
and so on in 5m steps

#68200:
Omni directional antenna with filter and amplifier
Native Antenna Gain: 2.5dBi
Amplifier Gain: 21dB
Noise Figure: <1dB
Size: 250mm long

Not recommended with less than
5dB cable attenuation or

Bias Tee

USB Power

#66006:
Radarcape
Power Supply
LAN cable
Magn. GPS Antenna

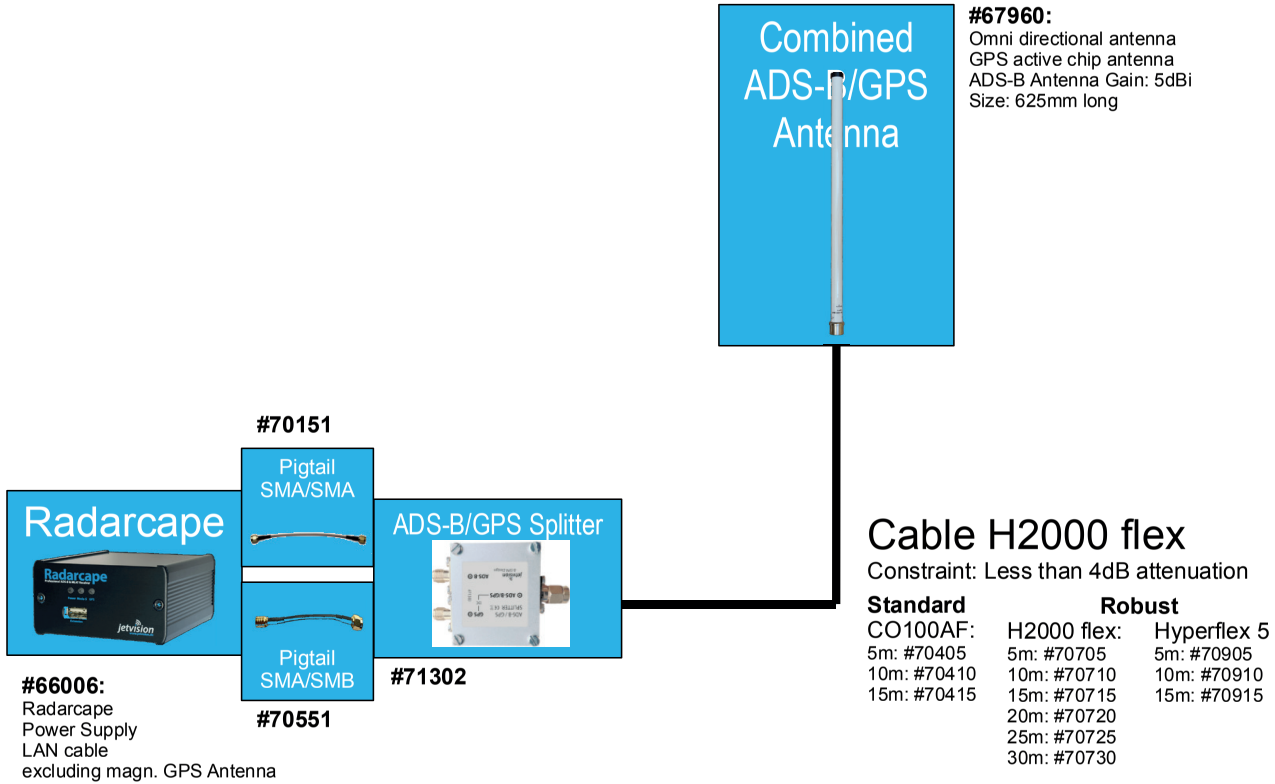
Coax cable

Permitted attenuation up to 15dB

Standard
CO100AF:
20m: #70120

Robust
Hyperflex 5
25m and more: on demand

Common cable for GPS and Mode-S up to 30m cable



Common cable for GPS and Mode-S more than 30m cable

jetvision

Active Diapason Antenna 1090MHz
#68200:
Omni directional antenna with filter and amplifier
Native Antenna Gain: 2.5dBi
Amplifier Gain: 21dB
Noise Figure: <1dB
Size: 250mm long

Active Diapason Antenna 1090

Cable Hyperflex 5

Permitted attenuation up to 15dB

Standard coax:
20m: #70120

Hyperflex 5:
30m and more:
extension cables on demand
available in 5m steps

#66916:
magnetic mounted GPS antenna
SMA connector, 5m cable
#66914:
Outdoor GPS Antenna

GPS Antenna

for 66914:
5m: 70305
10m: 70310
avail. in 5m steps

#70151

Pigtail SMA/SMA

Radarcape

Pigtail SMA/SMB

#70551

ADS-B/GPS Splitter

#71302

ADS-B/GPS Splitter

#71302

Coax cable

Standard:
0.1m: #70151
1m: #70101

Robust:
Hyperflex 5
1m: #70901
5m: #70905

#66006:
Radarcape
Power Supply
LAN cable
excluding magn. GPS Antenna

Trademarks & legal notices

The Radarcape has best performances and technical features, but it is not certified and not for use in highly sensitive air traffic control evironments. We do not give any warranty to the results and data. Any liability is excluded!

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German Head Office

jetvision GmbH
Am Rain 24
85256 Vierkirchen

Phone: +49 89 9545 991 20

www.jetvision.de
support@jetvision.de

jetvision