HF COMINT SYSTEMS

PRODUCT NAME / MODEL	RECEIVER TYPE	OPERATING FREQ.	INST. BANDWIDTH	INSTALLED SENSITIVITY	DYNAMIC RANGE	DEMOD TYPES
ASELSAN Inc.; Ankara, TURKEY; +90 312 592 60 00; www.aselsan.com.tr						
HF Direction Finding Reciever	HF Direction Finding	1-30 MHz	2 MHz	-105 dBm at <= 1 kHz resolution and 10 dB SNR	110 dB	AM, FM, CW, LSB, USB
HF Monitoring Receiver	HF Monitoring	1-30 MHz	2 MHz	-114 dBm CW at 0,3 kHz IFBW and 10 dB SNR	110 dB	AM, FM, CW, LSB, USB
Chemring Technology Solutions; Romsey, Hampshire, UK; +44 (0)1794 833000; www.chemringts.com						
LOCATE	Direct digitization SDR	1-30 MHz	4 independent freq. channels, each ≤ 32 kHz	NF: 12 dB	>103 dB (3 kHz BW, 10dB SNR, no AGC)	AM, LSB, USB, FM, CW, IQ
CommsAudit; Cheltenham, Gloucestershire, UK; +44 (0)1242 253 131; www.commsaudit.com						
CA7814-1	Digital	9 kHz to 32 MHz	Multiple Digital Drop Receivers with BW from 32 MHz to 250 Hz	NF: 10 dB max	160 dB	All
CA4904 (SPECTRA 830)	Digital	HFDF operating frequency range 1.5 MHz to 30 MHz	28.5 MHz DF Bandwidth. Multiple Digital Drop Receivers with BW from 28 MHz to 250 Hz	NF: 10 dB max	160 dB	All
Elbit Systems EW and SIGINT - Elisra; Holon, Israel; +972-77-2935411; www.elbitsystems.com/elisra						
TSR 3300	Direct sampling	1.5-30 MHz	selectable BWs up to 8 MHz	CW -119 dBm (RBW 800Hz, 10 dB S/N)	80 dB	AM, FM, SSB, CW
TDF 3300	Direct sampling	1.5-30 MHz	selectable BWs up to 8 MHz	CW -119 dBm (RBW 800Hz, 10 dB S/N)	80 dB	AM, FM, SSB, CW, hoppers
Elta Systems Ltd; Ashdod, Israel; +972-8-857-2312; www.elta.co.il						
ELK-7038 Wideband HF COMINT/DF Family	*	0.5-30 MHz	2 MHz	*	90 dB	AM, FM, CW, FSK, USB, LSB
Enablia S.R.L.; Rome, Italy; www.enablia.com						
TitanSDR	Direct sampling software radio	0.009 to 32 MHz	312.5, 625, 937.5, 1250, 1562.5, 1875, 2187.5 kHz	-116 dBm (0.34 µV) SSB at S+N/N=10dB, 15MHz, 2.4 kHz BW	>108 dB (SFDR)	USB, LSB, AM, NBFM, CW, eUSB, eLSB, FSK, IQ
FEI-Elcom Tech, Inc; Northvale, NJ, USA; +1 (201) 767-8030; www.fei-elcomtech.com						
SIR-1022	Superhet, IF sampling SDR	0.01-30 MHz	30 KHz	-122 dBm	105 dB	AM, FM, PM, SSB, ISB, IQ
SIR-1023	Superhet, IF sampling SDR	0.01-30 MHz	500Hz	-122 dBm	105 dB	AM, FM, PM, SSB, ISB, IQ
GEW Technologies (Pty) Ltd; Pretoria, Republic of South Africa; +27 (12) 421 6461; www.gew.co.za						
GRX6000 Multi-Channel Wideband Monitor Receiver	SDR	9 kHz - 30 MHz	up to 30 MHz	-127 dBm, mode dep	Up to 135 dB	SSB, CW, AM, FM, dig I/Q
MRD600	SDR	300 KHz - 30 MHz	up to 30 MHz	*	≥ 150 dB	No demodulator

SUPPORT DF	CHANNELS	POWER (W)	SIZE (HxWxL in/cm)	PLATFORM	WEIGHT (lb/kg)	FEATURES
Phase coherent operation for correlative interferometry	8	< 350 W	4U, 19 in.	Grd-mob	< 25 kg	Digital data stream IQ output at the selected IF BW; extensive built-in self test; ≥ 100 MHz/sec scanning speed; 16 DDR channels; 2 deg RMS installed DF accuracy
*	8	< 350 W	4U, 19 in.	Grd-mob	< 25 kg	≥ 1 GHz/sec scanning speed; 64 DDR channels
Super-resolution, N channel coherent	36	*	2U package	grd-fix, grd-mob	*	Configurable system that combines an antenna control unit, MCDWR16 multichannel monitoring receiver (comprising nine 4-channel DWR16 receivers) SRDF and E-copy server software and geolocation manager software.
HF interferometric HF super resolution and HF TDOA supported	Multiple digital drop receivers with BW from 32 MHz to 250 Hz	21 W per receiver (typ)	262 x 165 x 41 mm per receiver	Air; grd-mob; grd-fix, shp, sub	1.7 kg per receiver	Spectraview user interface; selectable RF preselection filters and LNAs; dedicated user FPGA available for customization
Super resolution N-channel HF DF	8+ channels, N-channel	*	19 in. rack mount	Grd-fix, grd-mob, shp	*	DF and continuous real-time HF spectrum monitoring; wideband and narrowband RF Recording; azimuth and elevation for all signals.
Yes	8 DDC channels	50 W	23.3 x 4 x 16 cm per receiver, up to 7 receivers in 7U height, 19-in. enclosure	Air; grd-mob; grd-fix, shp, sub	2 kg	Sub-octave preselectors for all bands, supports multi-channel monitoring, DF and jamming
Large array - Interferometer, small array – Watson-Watt	3-7 for large arrays, 3 for small array	250-500 W (according to no. of channels)	7U height, 19-in. enclosure	Air; grd-mob; grd-fix, shp, sub	up to 40 kg	Uses TSR-3300 receiver; sub-octave preselectors for all bands, very fast respond for jamming support, supports ground and sky wave, FF and FH signals
Yes, 1.5 deg RMS	*	*	*	air, grd-fix, grd-mob, shp	*	Multi-channel wideband HF radio interception and location; handles short transmissions (bursts), fixed and frequency hopping networks
No	4 wideband channels; 40 narrowband channels	15 (power consumption)	5.2 x 24.3 x 14.5 cm	Grd-fix	3.2 kg	*
Common synth	2-4	40	19-in. rack, 1U	Air, grd, shp	*	*
Common synth	2-4	40	19-in. rack, 1U	Air, grd, shp	*	*
No	Up to 4 indepent receivers (dep on config.)	< 150 W typ. (dep on config.)	2U x 19 in. x 400 mm	Grd-fix, grd-mob, shp	< 15 kg	*
Yes	*	< 150 W typ. (dep on config.)	4U x 435 mm (width) x 380 mm (deep)	Grd-fix, grd-mob, shp	28 kg	*

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L3 Technologies, Communications Systems-East; Camden, NJ, USA; +1 (856) 338-3285; www.L3T.com/cs-east						
SkyHawk Airborne HF Geolocation System	*	2-30 MHz	40 MHz	*	*	*
SkyHawk Maritime HF DF System	*	2-30 MHz	40 MHz	*	*	*
Leonardo DRS; Germantown, MD, USA; +1 (301) 948-7550; www.leonardodrs.com/SignalSolutions						
SI-8746 Harrier	Direct VLF/HF	10 KHz - 30 MHz	30 MHz and multiple configurable DDCs	*	*	Vita 49 wideband real 15-bits/samples or complex 64-bit/sample
SandDust HF Geolocation System	*	2-30 MHz	25 kHz	*	*	*
Mountain RF Sensors; Fort Lauderdale, FL, USA; (+954) 968-6566; www.mountainrf.com						
MtRF-2101	SDR	100 kHz-30 MHz	*	-126 dBm @ 1 kHz BW	120 dB	AM, FM, USB, LSB, CW, FSK
PLATH GmbH; Hamburg, Germany; +49 (0) 40-237-34-0; www.plath.de						
Radio Direction Finder DFP5130	Watson-Watt, direct sampling	0.5-30 MHz	29.5 MHz analog, 12.288 MHz digital @ 125 Hz freq. resolution	-139 dBm (min. detectable signal)	169 dB (SFDR2 105dB)	•
Radio Direction Finder DFP5135	Watson-Watt, direct sampling	0.5- 30 MHz	29.5 MHz analog, 29.5 MHz digital @ 125 Hz freq. resolution	-139 dBm (min. detectable signal)	169 dB (SFDR2 105dB)	•
Radixon UK Ltd; Derbyshire, UK; +44 1246 264962; www.radixon.co.uk						
G35DDCi	Direct sampling	1 kHz to 45 MHz	32 MHz	-121 dBm (0.2 uV)	111 dB min.	Analog, digital
Rohde & Schwarz GmbH & Co.KG; Munich, Bavaria, Germany; +49-89-4129-0; www.rohde-schwarz.com						
EB510	HF monitoring receiver, superhet and DDR	8 kHz - 32 MHz	32 MHz	<- -107 dBm	150 dB w/ 40 dB attn (1 dB steps)	AM, FM, PM, LSB, USB, ISB, CW, I/Q, pulse
DDF1GTX	High-speed scanning HF direction finder	300 kHz - 30 MHz	30 MHz	<- -140 dBm	150 dB	AM, FM, PM, LSB, USB, ISB, CW, I/Q, pulse
Saab Medav Technologies GmbH; Erlangen, Germany; +49-9131-583-0; www.saab.com/saabmedavtechnologies						
ARS-Compact	Direct sampling receiver	9 kHz - 30 MHz	Up to 30 MHz	NF < 10 dB	SFDR > 90 dBc @ BW=30 MHz	More than 200 analog and digitial transmission methods
ARS-Global	Direct sampling receiver	9 kHz - 30 MHz	Up to 30 MHz	NF < 10 dB	SFDR > 90 dBc @ BW=30 MHz	More than 200 analog and digitial transmission methods
Southwest Research Institute (SwRI); San Antonio, TX, USA; +1 (210) 684-5111; www.sigintsolutions.swri.org						
Model HFWB-128 Scout HF Acquisition System	Direct digitization with sub-band RF preselectors	2-30 MHz	12 MHz	MDS: -118 dBm in 1.5 kHz bw	94 dB SFDR	AM, FM, SSB voice, FSK, PSK, MSK, multi-tone, OFDM
Pathfinder - 3U VPX Acquisition and DF Processor	Supports 3U VPX tuners from BAE and DRS	2 - 30 MHz	8 - 28 MHz depending on processing resource configuration	Tuner dep.	Tuner dep.	AM, FM, SSB voice, FSK, PSK, MSK, multi-tone, OFDM
Model HFW-2400 Wideband N-Channel DF Server	Direct digitization with sub-band RF preselectors	2-30 MHz	28 MHz	MDS: -118 dBm in 1.5 kHz bw	94 dB SFDR	*

SUPPORT DF	CHANNELS	POWER (W)	SIZE (HxWxL in/cm)	PLATFORM	WEIGHT (lb/kg)	FEATURES
Yes, 2.5 deg RMS	*	80 W	12 x 67-in. pod	air	50 lb	Measures instantaneous vector to target from a single pulse, from a single platform; allows geo-location of a single, short-duration (one second) emission
Yes, 2.5 deg RMS	*	80 W	30 (dia.) x 24 (height)-inch radome	shp	85 lb	Measures an instantaneous vector to surface and airborne targets; utilizes small, fractional wavelength antenna elements; permits operator to discriminate between in-theater threats and out-of-theater emitters
4 channels phase coherent	4 independent digitized channels	100 W	1.75 (H) x 8.5 (W) x 22 (D) in.	*	*	HF tuner
Yes, 5 deg RMS	*	*	*	Grd-fix	*	Transportable; five loop antennas.
*	*	10 W	8.75 x 6.50 x 2.02 in. (Eurocard)	grd-fix	2.5 lb	Well suited for leave-behind SIGINT operations; all bandwidth filtering and demodulation is performed digitally utilizing a high-speed FPGA and microcontroller.
Yes (also in scan mode)	3	~250 W	3 HU x 19 in x 605 mm	grd, shp	~15.3 kg	•
Yes	5x3	~1400 W	4 HU x 19 in x 605 mm	grd	~40 kg	All over DF-ing of HF range.
Waton-Watt, Doppler, interferometry	3	*	8.57 x 3.87 x 0.7 in.	*	0.5kg	Ext. clock in/out
*	1+ 3 DDC	Typ. 45 W	213 x 132 x 450 mm	Air; grd-mob; grd-fix, shp, sub	7.5 kg	*
WFFM, scan, search	9+1 receiver channels	Max. 1200 W	426 x 176 x 600 mm	Air; grd-mob; grd-fix, shp, sub	29 kg	*
Yes	Up to 100	350 W	19-in. rack with 4 RU and 70 cm depth	Grd-mob; grd-fix, shp, sub	35 kg	Interactive or fully automated operation (detection, classification, production); wideband signal and result recording; remote operation; scalabale solution
Yes	Up to 3000	35 kW	multiple 19-in. racks	Grd-fix	*	Fully automated acquisition, detection, classification, demodulation and decoding of the complete HF spectrum; ADBF (adaptive digital beamforming) technology to resolve co-channel interference and multi-path propagation effects
Optional DF	1 channel acquisition only; 2 channel commutated DF	110/220/240 VAC, 1160 W	Two transit cases, 9.75 x 22.5 x 36.5 in. each	Grd-fix, shp, sub	100 lb per transit case	Automatic signal recognition and ID; integrated signal demodulators/ decoders; 24 hour storage of RF environment with narrowband I/Q extraction tool
Optional DF	1 channel acquisition only; 2 channel commutated DF	24 VDC, 350W	3U VPX chassis, 5.25 x 10.7 x 13.7 in.	Air; grd-mob; grd-fix, shp, sub	40 lb	Long term storage of RF environment (duration dependent on bandwidth and storage configuration) with narrowband I/Q extraction tool; interfaces to US standard DF and geolocaiton networks
N-channel beam steer vector match	8 standard, expandable to 24	110/220/240 VAC, 1500 W	12U x 27 in.	Grd-fix	275 lb	Instantanous DF from 2 to 30 MHz at a resolution of 100 Hz at a rate of 100 per second - configurable frequncy and time resolution; 72 hour storage of raw DF measurements

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TCI International Inc.; Fremont, CA, USA; +1 (510) 687-6100; www.tcibr.com						
TCI Model 802C	Dual channel	0 to 30 MHz	28 MHz	-120 dBm (antenna dep.)	90 dB SFDR	DF: All (DF process is modulation-independent)
TCI Model 802W	N-channel	0 to 30 MHz	28 MHz	-120 dBm (antenna dep.)	90 dB SFDR	DF: All (DF process is modulation-independent)
TCI Model 902	Dual channel or N-channel	0 to 30 MHz	28 MHz	-120 dBm (antenna dep.)	90 dB SFDR	DF: All (DF process is modulation-independent), Collection: AM, FM, LSB, USB, I/Q
TechComm, Inc.; Fort Lauderdale, FL, USA; +1 (954) 712-7777; www.techcomdf.com						
TC-5025/CGA	Superhet	0.2-30 MHz	4 MHz	0.5 uV	100 dB	AM,FM,SSB,CW
Thales; Gennevilliers, France; +33 1 46 13 20 00; www.thalesgroup.com						
TRC 6200, HFDF version	Direct sampling	1-30 MHz	29 MHz	-125 dBm	120 dB	DF on all modulations
TRC 6500	Direct sampling	0.5-30 MHz	30 MHz	-125 dBm	120 dB	DF on all modulations

SURVEY KEY – HF COMINT SYSTEMS

MODEL

Product name or model number

REC TYPE

Receiver type

- DDR = direct digital receiver
- DF = direction-finding
- dig = digital
- HF = high frequency
- SDR = software-defined radio
- superhet = superheterodyne

OP FREQ

Operating frequency in kHz, MHz or GHz.

INST BW

Instantaneous bandwidth (if different from operating frequency)

- BW = bandwidth
- DDC = digital down converter

TYP INST SENS

Typical Installed Sensitivity

- IFBW = intermediate frequency bandwidth
- MDS = minimum discernable signal
- NF = noise figure
- RBW = resolution bandwidth
- SNR = signal-to-noise ratio

DYN RANGE

Total dynamic range

- SFDR = spur-free dynamic range

MOD TYPES

Modulation types it can process

- AM = amplitude modulation
- CW = continuous wave
- eUSB = enhanced upper sideband
- FM = frequency modulation
- FSK = frequency shift keying
- I/Q = in-phase/quadrature
- ISB = independent sideband
- LSB = lower sideband
- MSK = minimum shift keying
- NBFM = narrowband frequency modulation
- OFDM = orthogonal frequency-division multiplexing
- PSK = phase shift keying
- SSB = single-sideband
- USB = upper sideband

SUPPORT DF	CHANNELS	POWER (W)	SIZE (HxWxL in/cm)	PLATFORM	WEIGHT (lb/kg)	FEATURES
Yes (Interferometer)	2	300 W	Processor: 5 x 19 x 20 in. (rackmount)	grd-fix, grd-mob	Processor: 50 lb	Dedicated HF DF-only system; all DF results stored in database; post facto processing; antenna array can be installed on non-graded field
Yes (dual-channel interferometer, n-channel correlative interferometer, or n-channel super-resolution/ MUSIC)	N-channel (one receiver channel per antenna array element)	800 W	Processor: 28 x 19 x 21 in. (rackmount)	Grd-fix	Processor: 150 lb	Dedicated HF DF-only system; all DF results stored in database; N-channel; optional super-resolution/MUSIC; post-facto processing
Yes (Dual channel interferometer, n-channel correlative interferometer, or n-channel super-resolution/ MUSIC)	2 or N-channel	300 to 1,000 W	config. dep.	grd-fix, grd-mob	Processors: 50 to 200 lb (config. dep.)	Collection and integrated HF DF system; all DF results stored in database; N-channel; optional super-resolution/MUSIC; post-facto processing
Phase and magnitude	1	45 W	3U rack mount	Grd-fix, grd-mob, shp	28 lb	TC-8365-1 DF antenna, mast mount, ferrite array
Interferometry or Watson-Watt	2	<100 W	47 x 14 x 31 cm	Air, grd-fix, grd-mob, shp, sub	< 15 kg	*
High resolution	10	config. dep.	19-in. rack, typ. 42U	Grd-fix, grd-mob, shp	> 200 kg	Simultaneous DF, monitoring and SSL; spatial filtering

SUPPORT DF

Does it support DF and with what technology?

- *MUSIC = multiple signal classification*
- *RMS = root mean square*
- *TDOA = time difference of arrival*
- *WFFM = wideband fixed-frequency mode*

 # REC CHANNELS

Number of receiver channels (RF paths) to create a complete system

PWR (in Watts)

Power dissipated in Watts per channel

- *VAC = volts, alternating current*
- *VDC = volts, direct current*

SIZE (in in/cm)

Size by height x weight x length, or diameter, in inches

PLATFORM

Platform

- *air= airborne*
- *grd= ground*
- *grd-fix = ground-fixed*
- *grd-mob = ground-mobile*
- *shp = shipboard*
- *sub = submarine*

WEIGHT

Weight in lb/kg

OTHER ABBREVIATIONS USED

- *opt = option/optional*
- *dep = dependent*
- *config = configuration*
- *wband = wideband*
- *nband = narrowband*
- *< = greater than*
- *> = less than*
- *min = minimum*
- *max = maximum*
- *deg = degree*
- *freq = frequency*

** Indicates answer is classified, not releasable or no answer was given.*