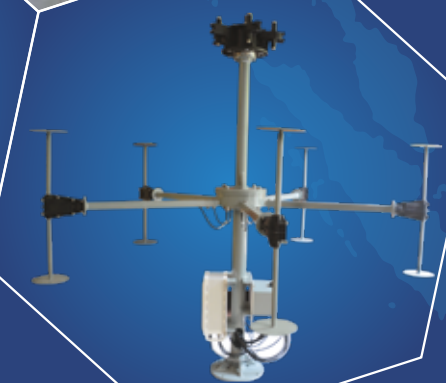
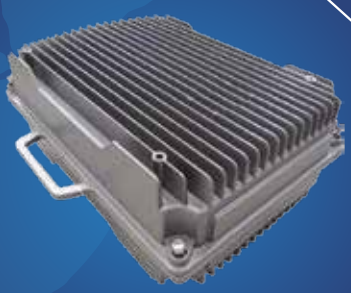


# Building the future through innovative solutions of **FARAZ ERTEBAT**



**FARAZ**  
Information and Communication  
Technologies and Services

Ver: 220910

# Our story begins in 2016

Our history travels back for more than 45 years

## Content

History	2
Brief	3
Cellular communication	5
Remote sensing	13
Satellite communication	18
Spectrum monitoring & DF	21
Automotive Products	27
Sub-Systems	28
Customer Support & Services	31

FARAZ ERTEBAT was originally operating from 1973 until 2016 as the radio Research and Development (R&D) department of a highly-advanced technology company based in Tehran/Iran. After years of constant growth in financial and human resources, the parent company has started to perform as a holding company. Consequently, the radio Research and Development (R&D) department was spun off from the parent company in 2016 as a separate company.



**FARAZ`S**  
Headquarter Company

Tehran-Iran  
**2022**

FARAZ ERTEBAT activities progressively last over 45 years in electronics and telecommunications, including research and development, design, and production of various projects. It seeks long-term commercial growth in the Information and Communication Technology (ICT) business. Moreover, FARAZ ERTEBAT has implemented many enterprise projects in both urban and rural regions in oil and gas, petrochemical, railway, mining, and energy industries.

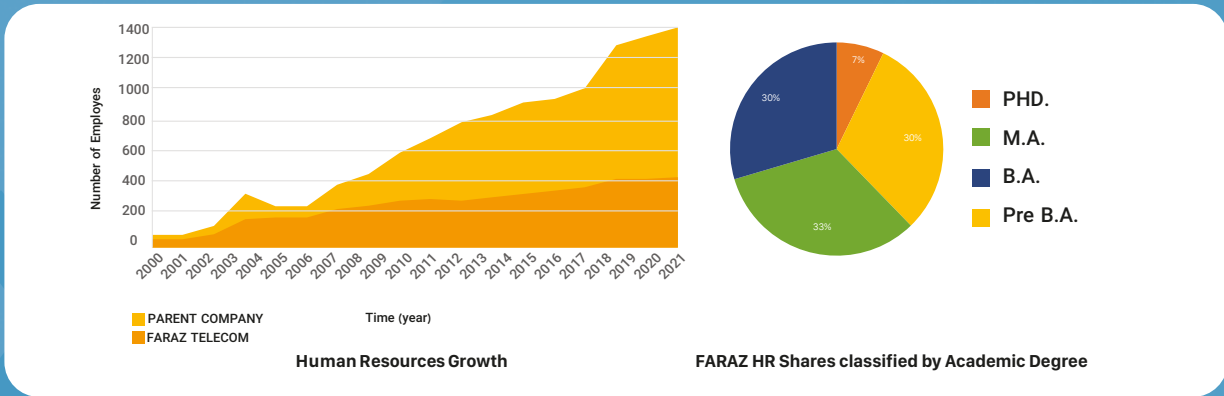
### **FARAZ ERTEBAT is a leading manufacturer of telecommunication solutions for professional users**

The independent, globally active technology company develops, produces and markets a wide range of electronic capital goods for industry, mobile network operators and government customers. FARAZ ERTEBAT is regionally among the technology and market leaders in all of its business fields, including wireless communications, optical communications, TV broadcasting and technologies related to monitoring and analysis of radio signals. Service center representatives not only ensure competent and customer-oriented on-site support anywhere in the world, they also safeguard customer investments with comprehensive service and support offerings.

FARAZ's Parent Company

**1973** - Tehran/Iran

As a large-sized company consisting of qualified personnel picked from the most prestigious universities in the country, Faraz ERTEBAT has one of the most potent research and development units in the three branches of telecommunications, software, and mechatronics. The R&D department has the ability of testing and evaluating of all its products, through its well-equipped and advanced laboratories and testing calibration sites unique in the country.



- Providing comprehensive solutions to meet the requirements of the Spectrum Monitoring and Management Domain.
- Designing and manufacturing telecommunication systems based on modern technologies, according to customer's requirements.
- Providing solutions to solve industrial problems in the satcom and terrestrial communications.
- Design and production of spectral frequency monitoring systems and radio direction finders in HF/VHF/UHF/SHF bands.
- Design satellite tracking systems and monitoring from 1 to 40 GHz.
- Implementation of modulation and error correction coding for complex satellite channels.
- Providing services in identifying satcom interference (Geo Location).


## Our Business Fields

**Automotive Products**



Effective solutions in the design and production of technological products of the automotive industry with the use of local knowledge and capacities.

**Spectrum Monitoring**




Radio spectrum monitoring systems, mobile network analysis, radio direction findings for regulatory agencies and mobile network operators

**Satellite Communications**




Secure satellite communication system with an advanced satellite signal interference detection system to create the best quality in communication

**Cellular Communications**



Mobile network antennas and equipment, with the latest cellular technologies.

**Remote Sensing**



Our advanced urban radar systems include perimeter surveillance, stand-off threat detector, and anti-drone systems.

**Secure Communications**



Providing professional safe and secure communications solutions to enable the highest level of reliability

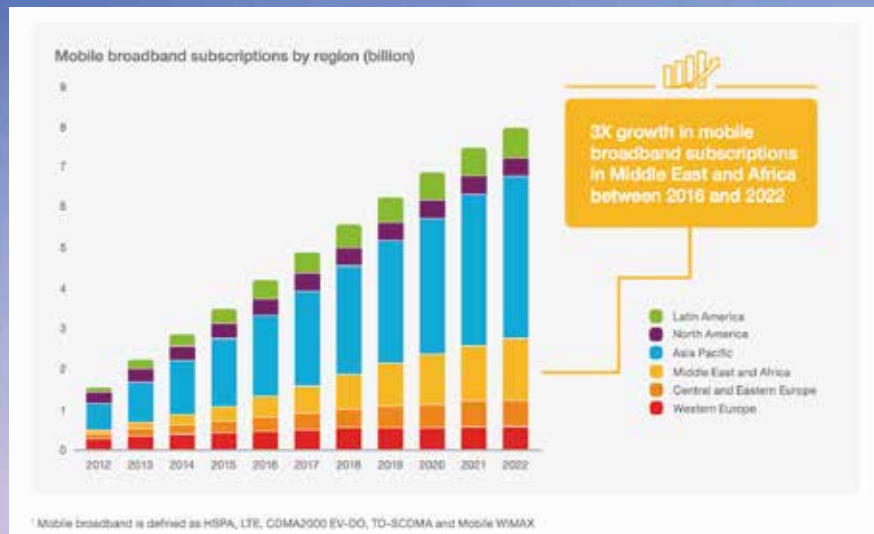


# Telecom market trends & the growing need for **bandwidth**

In a radio communication system, it is one of the most significant problems to use the radio frequency spectrum as efficiently as possible, because the radio frequency spectrum is finite. Thus, nationwide authorities are needed for regulating and managing the radio frequency spectrum to gain a net social benefit by promoting spectrum usage efficiency.

Increasing demand for services such as mobile telephones and many others has required changes in the philosophy of spectrum management. Demand for wireless broadband has soared due to technological innovations, such as 3G, 4G, and 5G mobile services, and the rapid expansion of wireless internet services. Besides the growth in radio communications which makes available frequency spectrum crowded, modern more complicated signaling types are continuously necessitating more advanced telecom transmitters, receivers, measurement devices, spectrum monitoring & management solutions, interference detectors , etc.

The market trend is especially challenging for national authorities who manage the spectrum to lower the ongoing interferences while they are updating their spectrum monitoring systems on a sustainable basis due to the market technological changes so they can continue effectively performing their role.

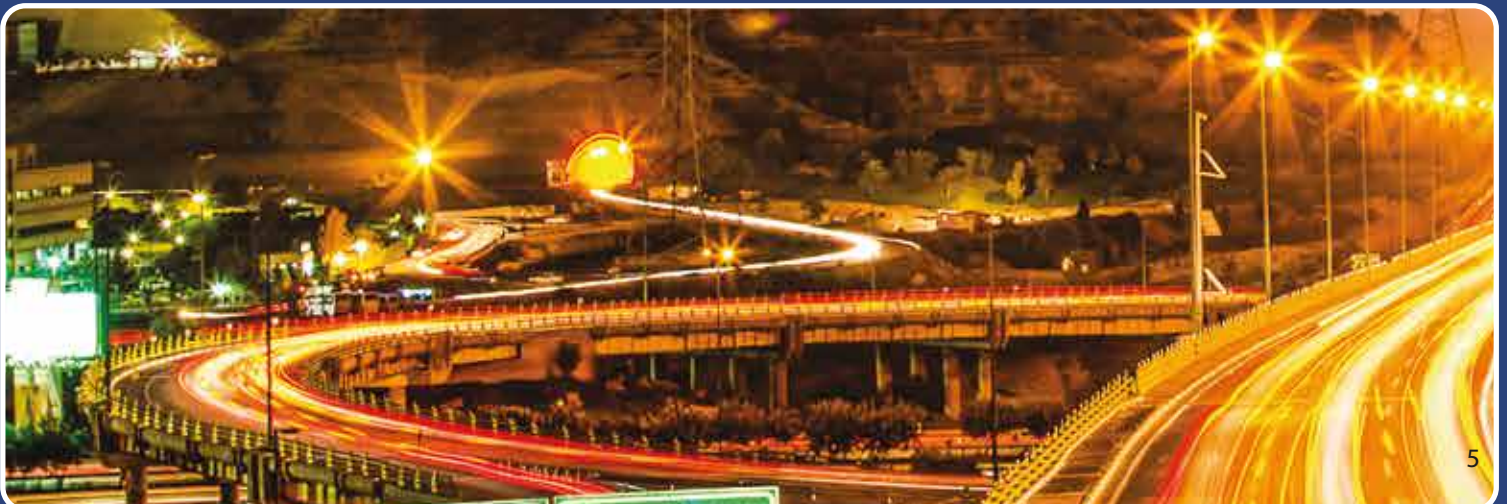


The demand for radio spectrum has grown significantly in recent years globally. Only in Middle East and Africa, the radio spectrum usage will be grown up to 3 times greater in the year 2022 according to the market trend anticipations.



# Cellular Communication Solutions

Enclosed area out of services



## CONVENIENT WIRELESS BROADBAND ACCESS

FV-IGC4000H is an advanced 4G LTE indoor WiFi & SIP VoP CPE product specially designed to enable quick and easy LTE fixed data service deployment for residential and SOHO customers. It provides high-speed LAN, WiFi and VoIP integrated services to end-users who need both bandwidth and multi-media data service in residential homes or enterprises.

## RELIABLE PERFORMANCE

FV-IGC4000H is a multiport indoor WiFi & VoIP CPE based on the standard implementation of LTE Release 9 specifications. With built-in high gain LTE antenna, it enables a longer reception range from the base station. This yields efficient use of the network with a larger cell reach, guaranteed carrier class service, and customer service probability and meet the different operating requirements in various countries and regions.

## EASY USAGE & MANAGEMENT

FV-IGC4000H is a user-friendly LTE CPE and very easy to configure and setup. Subscribers can just connect the device to their computer or home switch/router and the device is ready to offer an experience of surfing over the Internet.



# F A R A Z Small-Cell

Faraz 4G Small-Cell product is used to launch the LTE network in rural areas. The product is a low-cost and high-performance eNB that be used instead of high-cost macro-cell eNBs used in urban and populated areas. It can also be used in the mono sector scenario and Omni-directional antennas to cost down launching the 4G network deployment in low population areas (Such as Village, oil rigs, etc.). The Small-Cell can be customized to different sub-6GHz frequency bands. The high output power makes it feasible to cover a large area.

Compact size and lightweight hardware make the Small-Cell a perfect candidate for coverage scenarios such as industrial sites and rural areas. Highly flexible networking and fast integration help operators increase network quality and improve user experience (QoS/QoE).

Faraz 4G LTE Small-Cell solution provides LTE network operators, site providers, content providers, and integrators with high-quality cellular network coverage and allows easy access to the network core. The high-end SDR-based Small-Cell is designed for 1 or 3 sector scenarios and supports LTE standard (Release-13) up to 20 MHz bandwidth (Downlink: 150 Mbps, Uplink: 75 Mbps) customizable to all sub 6 GHz bands.

Small  
Cell



# Radio Link

As service providers and enterprises scale their wireless access networks to enable powerful new applications and services, many existing backhaul solutions are rapidly becoming a major bottleneck. FARAZ co. is building reliable backhaul networks everywhere with packet and hybrid microwave backhaul solutions that unleash the potential of true broadband mobility. Designed to meet the varied requirements of mobile networks, small cell deployments, public safety, and other applications, our highly flexible backhaul solutions deliver unmatched capacity, reliability, and cost-efficiency, while supporting a smooth evolution to advanced packet networks.

The FARAZ microwave radio link solution consists of two categories, traditional 18GHz frequency (RL18155), and E-band IP microwave (RLE2100) which have 155Mbit/s and 2.1Gbit/s of capacity, respectively. These are FARAZ's first generation of IP microwave radio links that supports hybrid TDM-Ethernet services on a unified platform, satisfying the requirements of large-capacity IP service transmission and IP-based evolving of traditional PDH/SDH microwave.

The solution provides a flexible architecture that can be deployed in split or full-outdoor scenarios with an end-to-end unified O&M management platform. These links can be deployed in broadband wireless transmission in vertical sectors, such as mobile backhaul, government, broadcasting, oil & gas, education, and electric power.

The RL18155 is a compact radio allowing operators to scale their networks at a low cost. RL18155 is running on 256 Quadrature Amplitude Modulation (QAM) capability and a Maximum of 28MHz Bandwidth. These capabilities allow our technology to deliver 155 Mbps in a single radio.

The high-tech FARAZ's E-band microwave radio RLE2100 is also a compact radio allowing operators to scale their networks at a low cost. RLE2100 is running on 64 Quadrature Amplitude Modulation (QAM) capability and Maximum 500MHz Bandwidth. These capabilities allow our technology to deliver 2100Mbit/s.

The combination of high spectral efficiency and high gain radio enables operators to grow their networks through cost efficiency and reduction of antenna footprint.

## Solution Highlights

- Zero Footprint, split mount, or full-outdoor.
- Wide Channel Support
- Up to 256 QAM Modulation Support
- SyncE and IEEE 1588v2 Support
- Ethernet Switching
- User-friendly NMS
- SNMPv3 support

## Key Applications

- 4G and 5G Mobile Any Haul
- Backhaul Aggregation
- Leased Line Replacement
- Last-Mile Fiber Extension
- LAN/WAN Extension
- Private and Enterprise Networks
- All-Outdoor Trunking Application





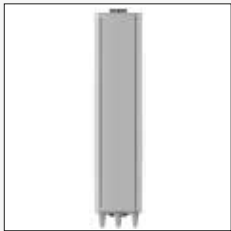
# Cellular Antennas

The proposed antenna is a MIMO antenna, consisting of dual-polarized dipole antenna elements, all contained within a single radome providing MIMO capability for high-speed wireless access services.

The proposed antenna enables MIMO communication using an optimized structure with coaxial output ports. Excellent isolation and low correlation between different streams of data, guaranteed by proper spacing of the columns, ensure optimum MIMO performance. Considering the differences in RET output ports for Huawei, Nokia, and Ericsson radios (OOK via calibration port or parallel via AISG connector), we have developed a RET module compatible with both input modes. This ret module employs FlexiRET Technology.



DF and BTS antennas are Faraz's manufactured



**Directional Dual-Polarized Triple-Band BTS antenna covering the Entire Spectrum in use for 4G, 3G/UMTS PCS, AMPS and GSM wireless systems, with frequency range:**  
 790-960 MHz  
 1710-1920 MHz  
 1920-2180 MHz

Triple Band BTS Antenna - ZBA-3M15.5



**Dual-polarized beamforming BTS antenna is covering the 3.2-3.8 GHz WiMAX/LTE Band.**

- A multi-beam antenna with increased directivity
- Excellent for TD-LTE and TD-SCDMA applications
- Dual-polarized operation suitable for polarization diversity
- Electrically adjustable down-tilt angle up to 12o in elevation
- Easy RET Technology

TD-LTE 8T8R Antenna



The proposed antenna is a 4T4R MIMO antenna, consisting 24 wide-band, wide-beamwidth dual-polarized dipole antenna elements, all contained within a single radome providing MIMO capability for high speed wireless access services including TD-LTE and FD-LTE.

4T4R MIMO Antenna

Specifications	4T4R MIMO Antenna	TD-LTE 8T8R Antenna
Frequency range	2300-2700 MHz	3300-3800 MHz
Connector	(4x) 4.3-10 Female	(8x) N Female 50Ω
VSWR	< 1.4:1.0	< 1.5:1.0
Polarization	Dual slant-linear (+45° & -45°)	Dual slant-linear (+45° & -45°)
Gain (dBi)	18dBi (Typ.)	17dBi (Typ.)
Horizontal beam-width	65- 68°	90±10°
Vertical beam-width	4.5°	6°
Isolation	Inter-column	>30 dB (Typ.)
	Cross-polar	27 dB
Cross polar Ratio	Main direction	18 dB
	±60 ° Sector	10 dB
Electrical down-tilt	Down-tilt 2-12°	Down-tilt 2-12°
Maximun Input Power	300W	100W
Sidelobe suppression for first sidelobe above main beam	>17 dB	>15 dB
PIM (3rd, 5th order)	-150 (dBC)	-

RET Port Compatibility (4T4R MIMO Antenna)	
Huawei Radio	Standard AISG Port /OOK Port
Nokia Radio	Standard AISG Port
Ericsson Radio	Standard AISG Port

# Penta&Octa-Band Antennas

Elegant and domestic-made designs are the distinguishing features of FARAZ's antenna portfolio.

FARAZ antennas are based on fully fledged engineering knowledge as well as decades of practical experience.

Faraz Penta&Octa-Band antennas are designed to cover all sub-3GHz cellular frequency bands, namely 698-960MHz and 1695-2695MHz.

Adjustable electrical down tilt ensures optimum coverage and easy troubleshooting of the network. Easy-RET configuration provides the possibility of replacement in the case of possible damages.

AISG 2.2 is implemented using upgradeable and bootable firmware to assure compatibility with the potential development of the network.

Fiberglass Radom covers the internal antenna components to assure optimum performance concerning stability, stiffness, UV resistance, and harsh weather resistance.

The antenna is supplied with two stainless steel brackets.



# Coverage area improvement solution

The ZFORs system is designed to solve problems of weak mobile signals in distant regions from the Base Station (BTS) using an underground fiber optic cable network. ZFORs is a Multi-Operator System with a frequency coverage of 88 to 2700MHz – TETRA, TETRAPOL, GSM, WCDMA, and LTE - solving any coverage and capacity issues due to its easy frequency band adaptation, sufficient output power, and network topology, regardless of protocol or modulation.

## Operational features

- Providing radio coverage networks, communication FM, Public Safety, 2G, 3G, and 4G up to 2700MHz
- Standard environmental, safety, EMC and ESD approval from the Information Technology Research Center (ITRC)
- Utilization of optical transmission link with DWDM technology up to 20Km



## Applications

- Railway & Subway Tunnels
- Mining Districts, Factories, etc.
- Airport, Hotels, Shopping Malls, etc



## Faraz pLTE Network

FARAZ Private LTE Network family of products is comprised of standard (3GPP release 14) LTE network elements as eNodeB and EPC. As a complete standalone LTE network, FARAZ pLTE is able to deploy an LTE coverage in a specific area, in three different modes: man pack, on wheels and in site; covering all tactical and static use cases. As an LTE network element, S1-AP standard link has enabled both FARAZ eNodeB and FARAZ EPC to be able to be merged in any LTE network.

Faraz pLTE EPC is comprised of MME, HSS, SPGW, IMS, and eMBMS Gateway; able to connect to any LTE eNodeBs including Faraz's and establish a secure, customized, reliable network. By the power of various LTE authentication procedures, Faraz private LTE network can manage to authenticate its dedicated SIMcard inserted UEs (User Equipment) and therefore create a private and scalable coverage in any frequency band (LTE bands are preferred due to compatibility with LTE Devices) for a specific geographical area; enabling various usages including telecommunication, telemonitoring, and teleoperating.

### Features

- Accessible by dedicated SIMcards to manage the privacy and security
- Fully configurable network to classify accessibility and type of services for different groups of UEs
- Compatible with all LTE Devices
- Compatible with other EPCs and eNodeBs
- Able to support VoLTE calls and SMS
- Able to support IoT with LTE-M and NB-IoT

#### Application

SMS | Data | VoIP/ VoLTE

#### EPC

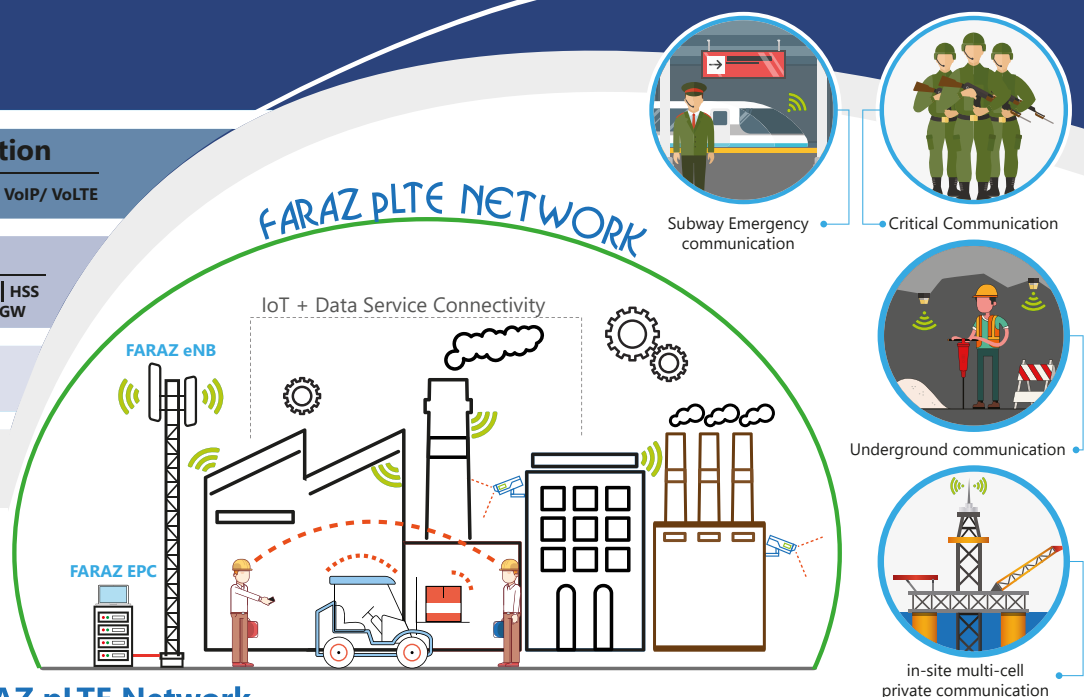
MME | SPGW | HSS  
IMS | eMBMS GW

#### Access

LTE eNodeB

#### Devices

LTE/NB-IoT UE



### FARAZ pLTE Network

**Band Width :** 200kHz (NB-IoT) / 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz

**Mode :** SISO / MIMO 2x2

**Tx. Mode :** 1 / 2 / 3 / 4

**Duplex Mode :** FDD / TDD

**NB-IoT Mode :** In-band / Guard-band / Standalone

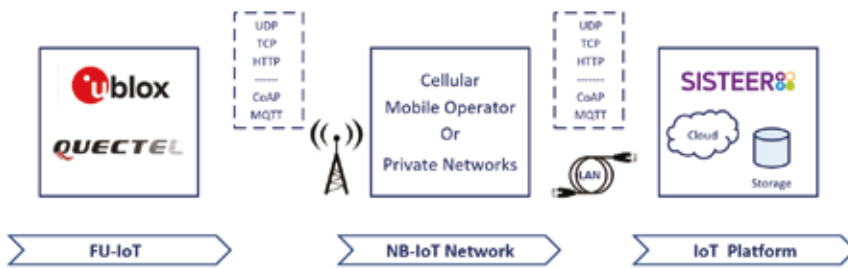
**Embedded EPC :** MME / HSS / SPGW / IMS / eMBMS Gateway

# NB-IoT Transceiver

## FNB-IoTM



The FU-IoT is an NB-IoT module suitable for low-power, large-scale, smart remote sensing in NB-IoT powered networks. As a part of our ultimate end-to-end IoT solution, the FU-IoT has been designed in two classes based on both the "Ublox" and "QuecTel" products; Being able to cover a wide area of needs in NB-IoT networks for in-band, guard band or standalone modes. By means of different power consumption reduction methods added in 3GPP release 13 including PSM (Power Saving Mode) and eDRX (extended discontinuous reception), and also the ability to upgrade the firmware simply over the air, the FU-IoT has become a powerful choice for the smart city including gas/ water/ electricity metering in small to huge network scales.



### Features

- LTE Rel.13 cat NB1
- LAN API (based on "SISTEER" platform)
- Low latency
- Compatibility with in-band, guard band, and standalone NB-IoT networks
- Firmware upgrading Via UART and Over the Air
- Supporting Datagram Transport Layer Security (under development)



## LTE Analyzer

FARAZ LTE Analyzer is an easy-to-use device to fully analyze any active LTE network in a specific area by providing all the information simply on a personal computer. LTE Analyzer comes as a receiver connected to a PC with its dedicated software. Being small and relocatable has made it practical for driving field tests to recognize any active LTE user or operator online.

## SHAHIN

SHAHIN is a cellular monitoring system comprised of one or more measuring nodes and a server used to evaluate the key parameters of a cellular network. The measuring nodes are cellular-phones empowered by SHAHIN software and connected (online/offline) to the processing server. By the power of this software, they'll be able to provide the user with the parameters needed to evaluate QoS, QoE, and the coverage map of the cellular networks.

Name	IMSI	IMEI	Type	Frequency	Cell ID	PLMN	...
1	2019-08-08 07:01:20.712 25	CGI# 1800000000-0000-0000-0000-0000-0000-0000-0000	...	...	...	...	...
2	2019-08-08 07:01:20.712 25	CGI# 1800000000-0000-0000-0000-0000-0000-0000-0000	...	...	...	...	...



# Perimeter surveillance solutions





# Perimeter surveillance radar

Perimeter surveillance radar is capable of being used in different weather circumstances through utilizing the cutting edge technology. The radar range has been restricted around 1000 meters. The equipment is able to detect and follow up all standing, seated and lying human in the range. The radar can be installed on between 1.5 to 10 meters heights in accordance with the application and coverage.

## Operational features

- K-Band frequency
- Usable in oil and gas refinery plant safety
- An acceptable system performance in inappropriate weather conditions
- Usable in Protecting border areas, military, railways, and etc.
- Capable of detecting human up to 200 meters away and vehicles up to 1000 meters away
- Able to communicate with CCTV cameras for better security coverage



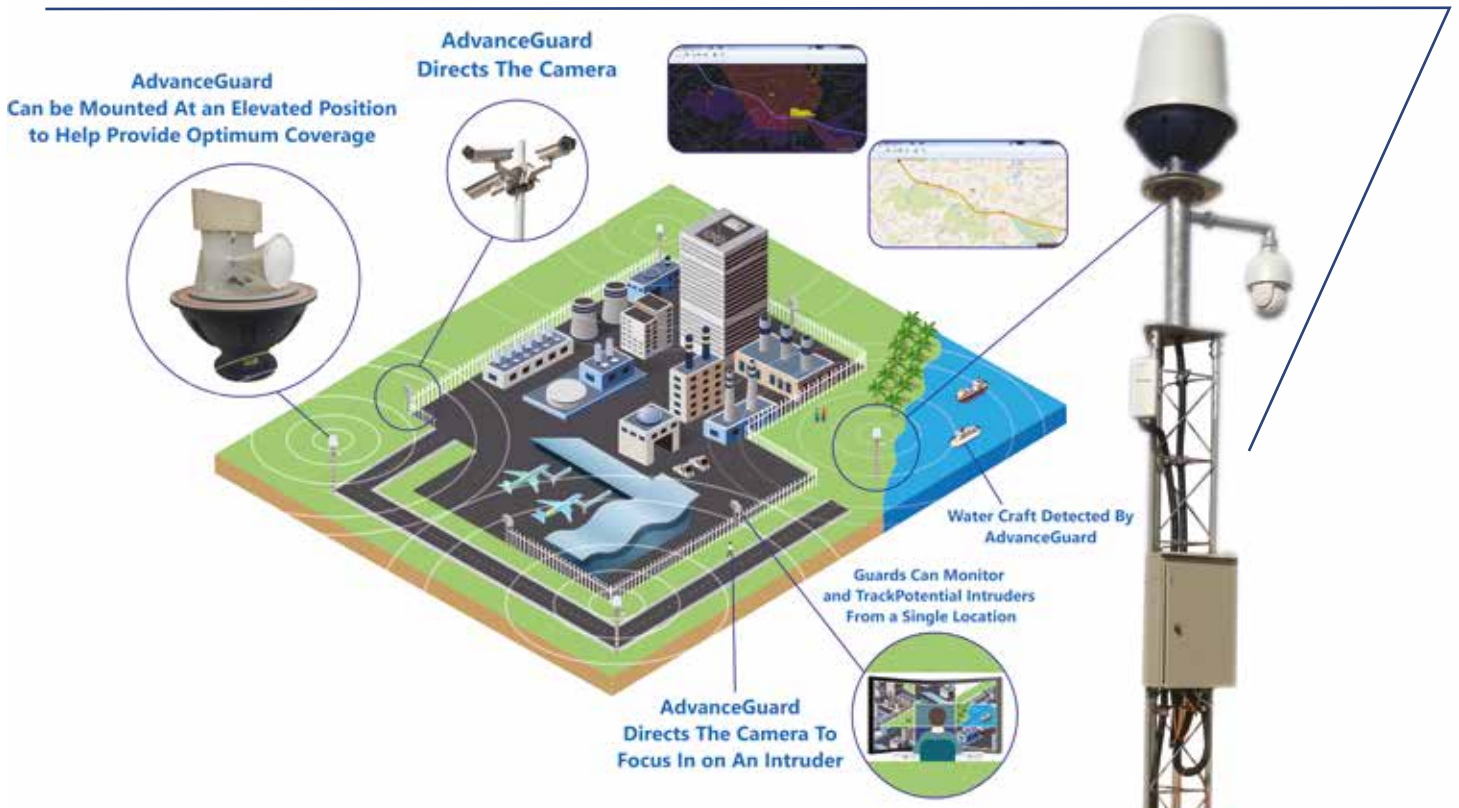
**ESFAND** is an indoor reactive jammer for all cellular, wifi, GPS and Bluetooth signals. It is designed to be small and low power. It can guarantee a cellphone-reception-free environment with minimum yet efficient power radiation. It is reactive in the sense that its goes from detecting the signal to automatic Jamming, sleeping and cycling. The targeted frequency bands, the radiation power and cycle time can be set manually.

ESFAND



**HAFEZ** is a high-power semi-smart jammer for cellular communications and is able to identify and process downlink signals of all cellular communication bands (2G/3G/4G) in a region and categorize them by their characteristics. Hafez system generates the jamming signal corresponding to each selected channel in accordance with its frequency and technology. After appropriate power amplifying, it broadcasts jamming signals in the desired area by Omni or Directional antennas.

HAFEZ



## Applications

- Coastal Safeguarding, Industrial Areas Safeguarding, etc.
- Airports Safeguarding, Country Borderline Safeguarding, etc.
- Area Safeguarding in Dark or Misty Regions

# Standoff threat detection

The soft20 threat detector system works as a remote early-warning microwave indicator which uses millimeter electromagnetic waves in order to detect explosive belts, pistols, rifles and etc. hiding under cover (ex. Clothe) locating 20 meters (extendable up to 100 meters) far away from the system.

## Operational features

- Capable of detecting explosive belts and etc. in 20 meters of range (extendable up to 100 meters)
- Capable of threat detecting in less than 1 second
- Night-vision mode available for operating in any low light or complete dark situation
- UPS backed-up power available for operating in the areas with no electricity available
- Capable of being used with a standard tablet or a wireless gamepad for an operator to be located in a distant safer place
- No body (or body organs) scanning for protecting personal privacy



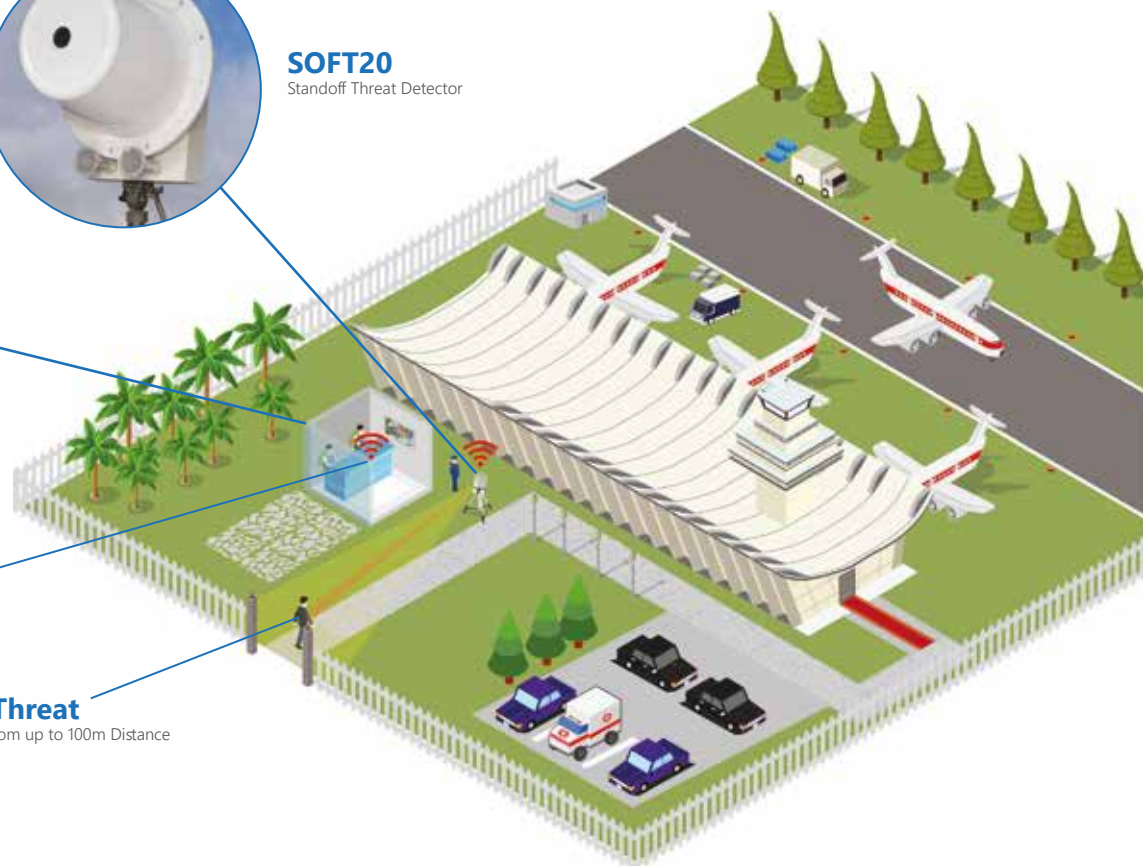
**SOFT20**  
Standoff Threat Detector



**SOFT20 Software**  
Security Officers Operate the Software

**Wifi Connection**  
Between SOFT20 & Control Room

**Under Scan Probable Threat**  
The Probable Threat Could be Detected From up to 100m Distance



## Applications

- Crowded areas safeguarding
- Distant checking station, Entrances safeguarding
- Building and VIP safeguarding

# Anti Drone System

The FARAZ Anti Drone System is used to detect the incursion of unwanted drones, based on the directional real-time measurement of the electromagnetic emissions of the drone and its remote control. It warns the operator when drones are in the area and send alerts.

The system has no limitation in detection range, usually the detection range always depends on the transmitter power of the drone/operator. Depending on the drone type, it could be more than several kilometers.

The FARAZ's ADS already gives an alarm as soon as a remote control is in air, so even before the drone is in the air. Counter-measures can therefore be initiated at an early stage.

Since FARAZ's ADS detects both the drone via its downlink signals as well as the remote control, the direction of both can be tracked immediately.

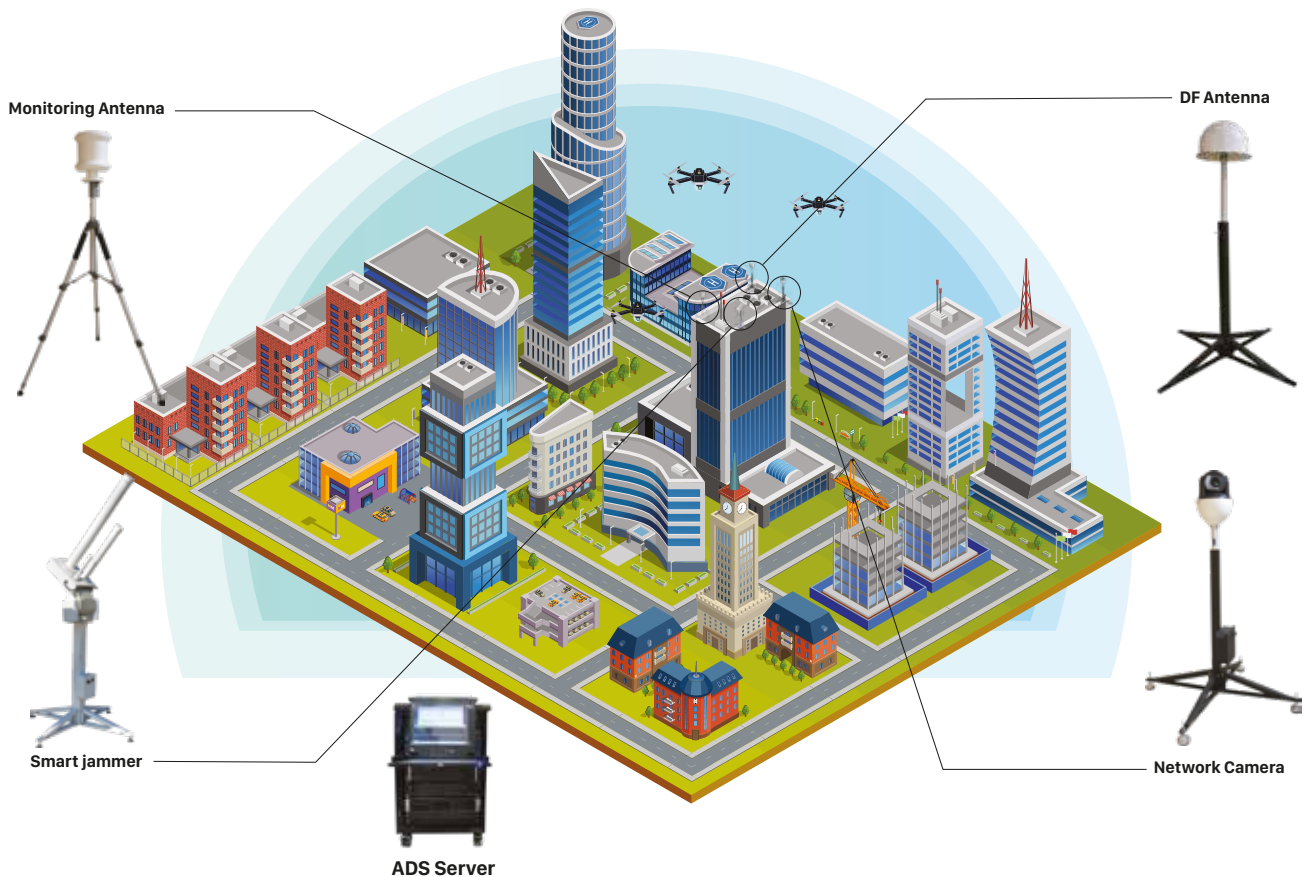
The system is extended by a jammer that can effectively prevent RF contact with a drone to force it into the fail-safe mode, e.g. to land or hover. The interference is extremely selective, that other RF channels are not impaired.

Besides the selectivity, the jammer is highly directional and only jams in the direction of the incoming UAV.

# ADS

## System Features:

- Real-time measurement of the RF emissions from drones / UAVs
- Detection of the operator controlling the drone
- Extremely high coverage, up to several km depending on the drone type
- Works with an unlimited number of drones at the same time
- Identification of the drone type (e.g. DJI Phantom 4)
- 360° coverage
- Covers a 2.8 GHz and 5.8 GHz frequency
- DF measurement accuracy up to ITU class A





# ADS

## Anti Drone Systems

FARAZ's Anti Drone System (ADS) is a multi-sensor surveillance solution with the capability of detecting, tracking, and neutralizing drones. The ADS by utilizing 3D radar, wideband monitoring, and direction finding (DF) with smart Directional jammer is an upgraded version of drone defense to protect critical territories which has an extended range of reliability for detection and identification.

The X-band FMCW 3D radar reports meticulous information about the position and the UAVs. The 3D radar can detect silent drones (automated drones) which are invisible for monitoring and DF sensors. By integrating 3D Radar with wideband monitoring and DF system, the flying UAV at low altitude or in urban and crowded environments would be detected which is rare in most products.

The system monitors, detects, and analyzes radio signals and estimates their parameters as well as the direction of the drone's and its pilot's signals. By measuring the similarity of the received signal with the existing commercial UAVs libraries, the type of drones (for example Phantom 4) will be identified.

To neutralize and counter the threat and prevent unauthorized UAV to enter the protected airspace, ADS uses a smart jammer that automatically receives commands from the 3D radar and DF system. Due to blocking the drone from receiving its operator's signals, the jammer transmits interference signals in the UAV's radio control frequency (RC Link), its pilot and GNSS bands that make the drone back to its point of origin or land. ADS provides an effective non-destructive way of disabling unwanted UAVs by emitting radio waves acting as an invisible shield into the covered area.

## Specifications

- Silent UAV detection by 3D radar
- High Reliability for detection, identification, and neutralization
- Typical radios coverage in open area: 3 km
- High accurate wideband 300MHz – 5.8GHz DF (1 degree)
- Identification and classification of drone types
- Detecting swarm of UAVs simultaneously
- Low weight and compact structure along with proper performance
- Using a high gain directional jammer with no interference in other directions
- Easy installation
- 24/7 surveillance



# Satellite monitoring system





## Satellite communications and spectrum monitoring systems

Faraz Company has been working on satellite monitoring in three major subjects of Satellite mobile networks monitoring, VSAT & Satellite communications monitoring and satellite location finding system over past decade. Faraz company has VSAT & Sattelite communications monitoring and satellite location and manufactures POOYAN and SOROUSH, additionally, has investigated on satellite location finder system and managed to produce KAMAND and RADICAL.

### Mechatronics

- Designing and production reflector systems up to 7.3m in diameter and better quality than 0.35mm
- Production of all kinds of full and limit motion pedestals extendable up to 13m reflector diameter and 0.01-degree accuracy.
- Designing and production of zero backlash controllers with a precise angle of fewer than 0.005 degrees
- Production of the reflector equipment containing feeds, Deicer, the earthing, and the lightning systems

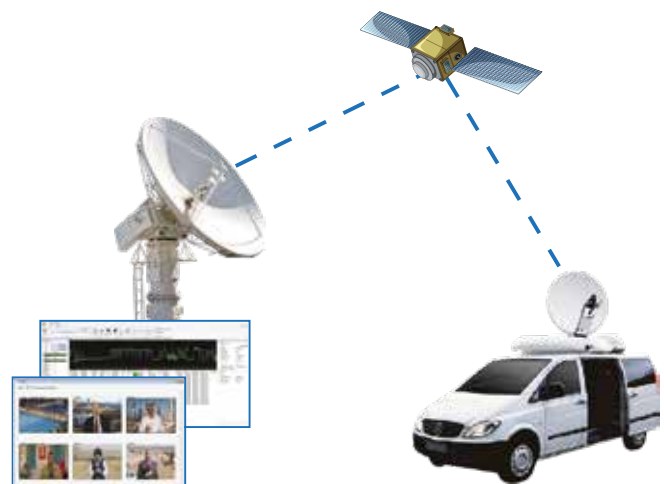
### POOYAN Satellite Monitoring System



POOYAN satellite monitoring system is a smart platform to fully identify and extract the main features of satellite telecommunication signals, containing P2P and broadcast channels. Pooyan software provides an online analysis of a whole L-Band signal with the spectrum 950-2150 MHz, determining the physical, data-link, and network layer characteristics of the detected channels.

### SOROUSH Satellite Monitoring System

- Fast signal spectrum updating in Spectrum Mode (for fine-tuning the receiving signals)
- Complete qualitative and quantitative blind monitoring of DVB-S/S2/SNG signals in Search Mode
- Automatic detection of the DVB-SNG signals
- Automatic storage of DVB-SNG signals on the memory (by .ts file extension)
- Indication of the active time period of all existing signals on L-Band (active time)
- Indication of the received signals (from the beginning of program startup) and the number of active signals, inactive signals, and scrambled signals
- Extraction & illustration of 6 simultaneous DVB-SNG signals



## Satellite Geolocation system

### KAMAND

Geolocation of radio transmitters which affects communications satellites in GSO orbit is a challenging task. There are two main reasons for satellite interference which are "deliberate interference" and "accidental interference".

Kamand uses the analysis of time difference of arrival (TDOA) and frequency difference of arrival (FDOA) compound measurements. Both of these measurement types require the transmissions to be monitored through a second GSO satellite in the vicinity of the primary satellite within an angle of fewer than 6 degrees. These satellites have a very small Doppler effect as observed at the ground-based station which can be detected using correlation techniques.

- Possibility of positioning for modulated signals and CW
- Positioning Error (on Average):
  - Modulated Signal: 15 km
  - CW Signal: 80 km
- Measurement Accuracy:
  - longitude: 0.05°
  - latitude: 0.1°

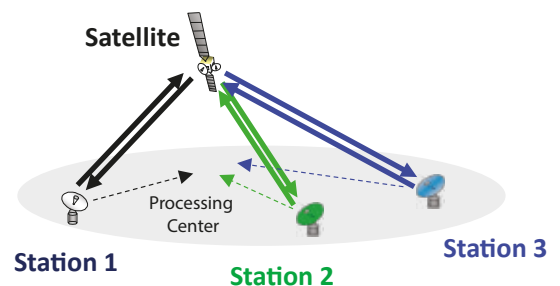


- Position reports on a High Resolution Map
- Supporting different satellite ephemeris formats
- Reprocessing and offline signal evaluation
- Ability to display 72MHz bandwidth spectrum from both satellites around unknown and reference carriers
- Ability to detect shadow signals by SNR down to -25dB
- Sampling Duration: 33 sec , processing Time ≤ 2 min

## Radio Calibration

### RADICAL

The satellite ephemeris which originated from the Internet does not have enough accuracy. Also, access to ephemeris of satellite operators may not be possible as well as the precision of satellite ephemeris data greatly affects the geolocation accuracy. A radical system can estimate the position and velocity vectors of GSO satellites with high accuracy. It uses both passive and active methods for this purpose. In passive mode, Radical uses the time-difference-of-arrival (TDOA) of at least three distant receiving stations. However, in active mode, there are three stations each of which transmits a signal to the satellite and then each of them calculates delay and doppler from the return signal. By using TDOA in passive mode and Delay/Doppler in active mode, the system provides precise real-time ephemeris data of GSO satellites. Having a good estimate of the position and velocity of the satellites has a huge impact on geolocation accuracy.



- Capability of arc coverage view from 10°W to 120°E
- Frequency bands: C & Ku
- Spectrum display capability up to 40 MHz
- Positioning accuracy less than 1500 m (Passive) and 500m (Active)
- Velocimeter accuracy less than 0.15 m/s (Passive) and 0.05 m/s (Active)
- Providing the output file in the TLE format
- Updating rate every 20 min.



# Direction Finders Family

High precision in direction finding and high sensitivity in discovery

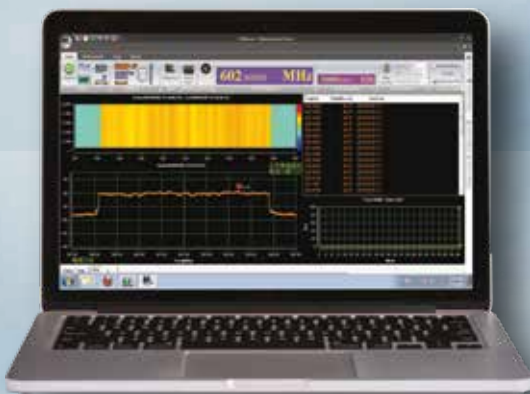


## Nationwide Monitoring Network Equipment

SM50Q is a standard system for monitoring and evaluation in accordance with ITU recommendations. Suitable instruments and analysis tools are available for each of the ITU requirements. Thanks to its modular conception, newly adopted ITU Recommendations can be included later.

- The frequency spectrum monitoring 9kHz - 40GHz automatically
- Broadband signal processing and transmitter identification
- Cellular analysis of the 2nd, 3rd and 4th generations (GSM, 3G, 4G, LTE)
- Remote control with a strong network from independent stations with varying structures
- Desirable antennas to benefit from various telecommunication uses with optimal receiving sensitivity
- Accurate and valid technical parameter measurement of radio signals direction finding
- Designed according to the latest ITU Spectrum Monitoring Standards (Edition:2011)

## Frequency Spectrum Monitoring System **SM50Q**



SM50Q Software  
(client-server application)





# MOBILE

## Monitoring and direction finding system

The broadband direction finder system operating in the frequency range 20MHz to 3GHz, IDF55Q, has the ability of real-time broadband monitoring which comes along with a real-time direction declaration of all existing carriers. The IDF55Q has an automatic elevating pole to survey the farther range and to achieve better sampling quality.

- Use of battery in portable application
- Outdoor and fanless designing
- Direction finding and spectrum monitoring in HF, VHF, UHF and SHF frequency bands
- Automatic identification and setting DF & MN antennas
- Monitoring Frequency Range: 9kHz to 8.5GHz
- DF Frequency Range: 20MHz to 8.5GHz

# IDF50Q



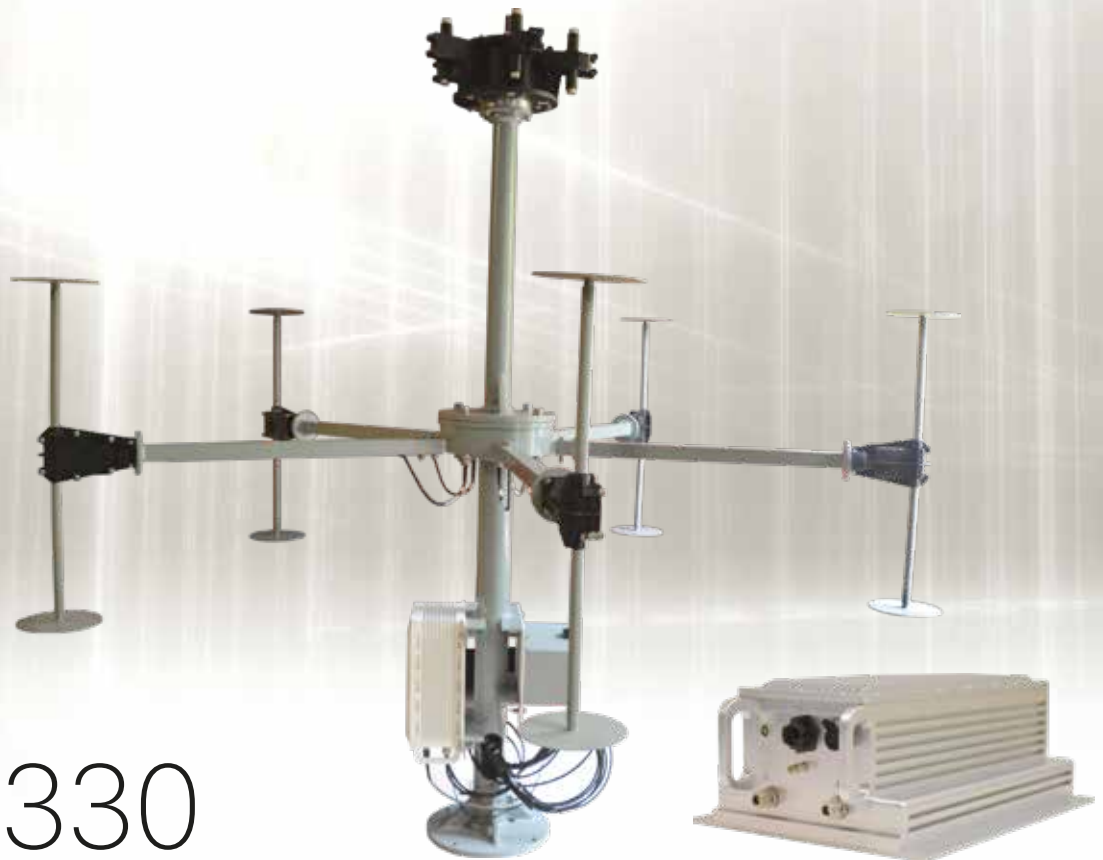
# STATIONARY

## Easy-to-install direction finder system

The SDF330 is a fixed, tactical, and easy-to-install direction finder system. The system is designed to be transported by cars and man can work temporarily on a tripod or fixed on an outdoor mast. In designing this system, the parameters of weight, power consumption, and dimensions are optimized. Moreover to the desirable technical system's specification, it is possible to install the whole system components including the antenna, switch, and DF box on the mast. The system is operational whit a CAT6 cable for data transferring & a laptop. The power is supplied with the PoE module: 24VDC.

- Use of 24VDC PoE (Power over Ethernet) power feed
- Easy Plug and Play
- Direction finding in VHF and UHF frequency bands (30-3000MHz)
- Easy to use PC or laptop control software via Ethernet included
- 25W power consumption
- 25Kg weight of the mast

# SDF330





# TACTICAL

## Direction finding system

TDF380 is the Tactical Monitoring and Direction Finding System. TDF380 is composed of different parts such as handheld monitoring active antennas, DF antenna-switch modules, battery pack, receiver, and backpack. This system is designed for tactical applications. The user can order optional parts as needed. It is capable of working in variable environmental conditions and will be operational in the shortest possible time.

The monitoring part of TDF380 is equipped with a handheld active antenna for localizing transmitter signal sources. DF Antenna- switch set in conjunction with receiver let the user find the direction of desirable signals. The user can utilize the battery pack where there is no utility power.

- Use of battery in portable application
- Outdoor and fanless designing
- Direction finding and spectrum monitoring in HF, VHF, UHF, and SHF frequency bands
- Automatic identification and setting of DF & MN antennas
- Monitoring Frequency Range: 9kHz to 8.5GHz
- DF Frequency Range: 30MHz to 8.5GHz

# TDF380



## V/UHF Handheld Monitoring Receiver

Model: PTM3000



### Features

- Ergonomic and rugged design for portable use
- Direction finding of a signal source with active directional antenna
- Control & data transferring via internal 802.11n 5GHz Wi-Fi module
- Spectrum and waterfall display on Android based tablets/smartphones
- Panorama scan up to 24 GHz/s with RBW of 10KHz
- AM & FM Demodulation
- DANL: -160 dBm in 1 Hz RBW
- Remote control and I/Q data output via LAN (up to 20MHz real-time)
- Built-in DC supply for active antenna
- Low weight of 3.5 kg (including battery)
- 5 hour of battery lifetime



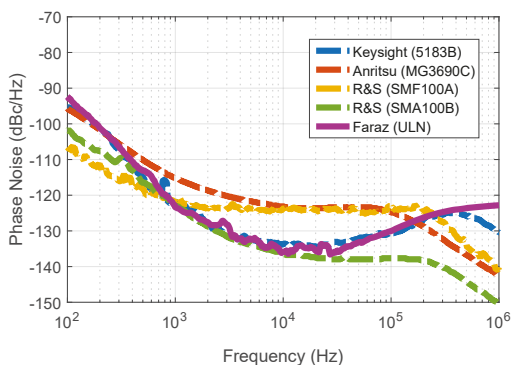
## Multi Loop Synthesizer

Model: ULN

### Features

- Measurement Instrument Grade Spec.
- Ultra low phase noise
- Wide frequency coverage
- Sub-Hz resolution
- Triple-loop architecture

Phase Noise Comparison (dBc/Hz)



Technical characteristics

Output Frequency:	5-10GHz *
Output Power:	+13dBm (typ.)
Phase Noise	-136dBc/Hz @ 10KHz for 6GHz carrier signal
Voltage:	+18VDC & +6VDC & -6VDC
Lock Time:	< 800usec
Step Size:	1Hz
Non Harmonic spurious:	-72dBc Typically (-65dbc max)

# AM/FM/GPS Car Roof Antenna

Active AM/FM/GPS Car Antenna is highly recommended for applying in all various types of vehicles even vans. The product enjoys having an appealing design, compact size, and cost-effective features.

The product is designed in a single package for simultaneous support of multiple technologies. The Antenna is compatible with all vehicles' standards and operates in all environmental conditions.

The product is comprised of Radio AM/FM and navigation antennas. The use of a single installation slot in the Antenna causes making a cutback on manufacturing cost and facilitates installation as well as decreasing holes penetration.



- High amplifiable and low noise active antenna
- 20-cm rod with high immunity to wind flow
- 12 VDC Power Supply
- Easy installation on the car roof with a single slot

# Shark-Fin Car Roof Antenna

Shark-fin antennas are commonly a collection of several technologies, all located together under a single radome or housing. The product enjoys having an appealing design, compact size, and cost-effective features and is highly recommended for application in all various types of vehicles.

Faraz Ertebat Shark-Fin Car Roof Antenna solution shows our attention to detail, with a commitment to giving the best quality components by coming away from conventional rod antennas and using efficient designs.

The Antenna is compatible with all vehicles' standards and operates in all environmental conditions. The product is comprised of Radio AM/FM and navigation antennas. Moreover, the solution is extendable by being embedded with other emerging technologies such as DAB, DSRC, DARS, etc. A single installation slot in the Antenna causes making a cutback on manufacturing cost and facilitates installation as well as decreases holes penetration.



- High amplifiable and low noise active antenna
- Lower profile and sportier compared to other antenna models
- 12 VDC Power Supply
- Easy installation on the car roof with a single slot



# Receivers & Processing Platform

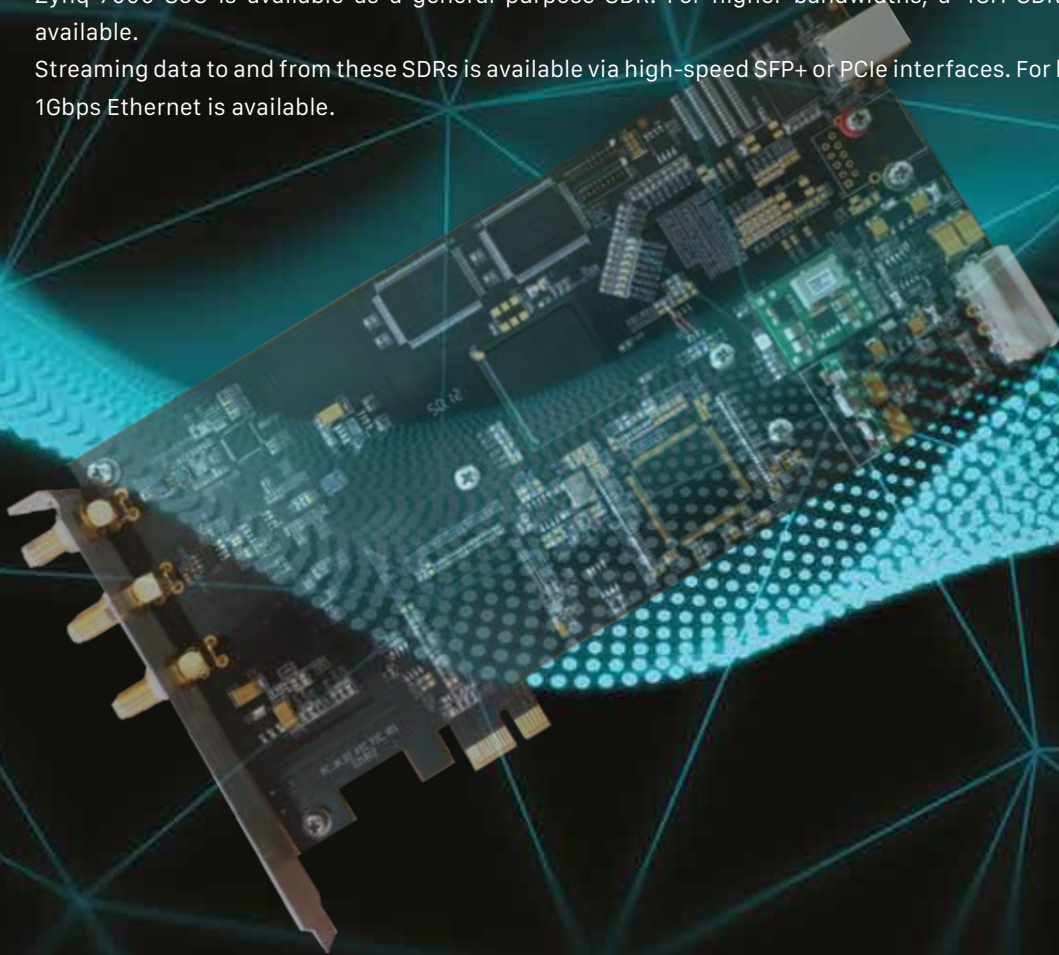
Our FPGA Carrier cards consist of Virtex6, Kintex7, Vitex7, and Zynq7000 (and Zynq Ultrascale Soc underway) for general or dedicated applications, answering different levels of processing power requirements. All of these boards are designed in-house and therefore fast and continuous technical support is guaranteed.

General FPGA Carrier Boards are equipped with DDR3 Memory, GPS Module, PCIe, 10Gbps SFP+, HDMI, USB, and 1Gbps Ethernet... interfaces. For future development, FMC connectors based on the VITA57.1 standard are placed on these carriers.

Up to 6ch ADC and DAC FMC daughter cards, consistent with VITA 57.1 standard are available to play or capture high bandwidth signals.

In the Mixed Signal area, we have developed multi-channel SDR platforms based on Analog Devices transceiver portfolio coupled with Xilinx FPGA or SoC products. For example a 6ch Rx., 6ch Tx. SDR based on three AD9361, coupled with a Zynq-7000 SoC is available as a general purpose SDR. For higher bandwidths, a 4CH SDR based on ADRV9009 is available.

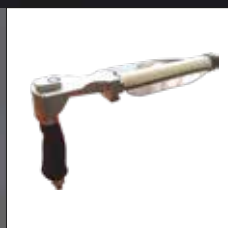
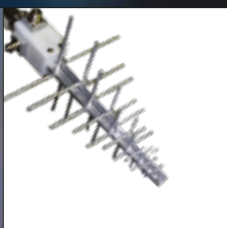
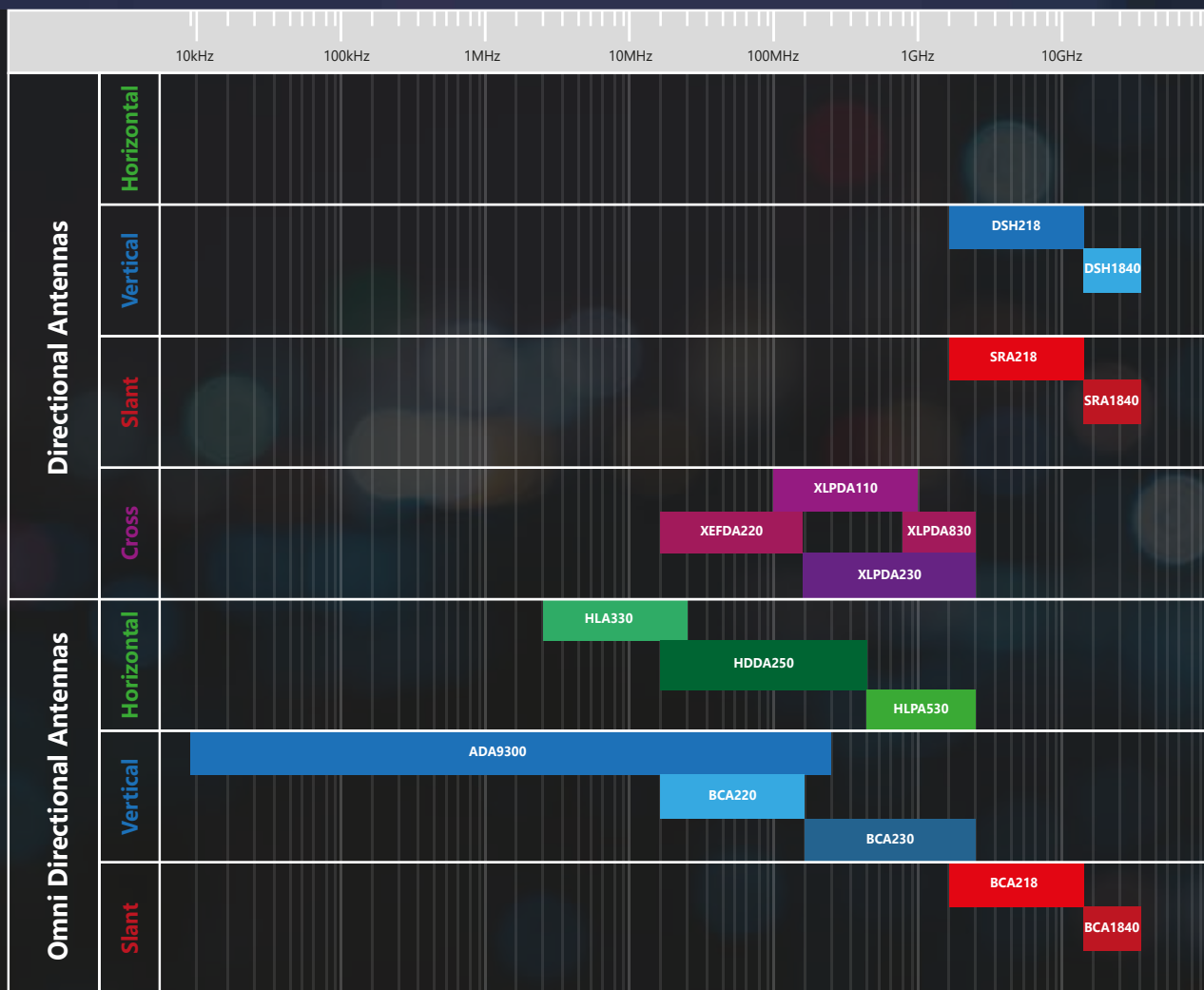
Streaming data to and from these SDRs is available via high-speed SFP+ or PCIe interfaces. For lower bandwidths, simple 1Gbps Ethernet is available.



# Spectrum monitoring antennas

## Wide Range of Antenna

- Directional, Omni Directional and Slant
- Vertical and Horizontal
- 9kHz – 40GHz



# Satellite antennas

Designing and production of diverse reflector systems up to 7.3m diameter and exceptional performance for various satellite communication applications form L to Ka-band frequencies.

Production of all kinds of full and limit motion pedestals up to 13m diameter and 0.01-degree accuracy.





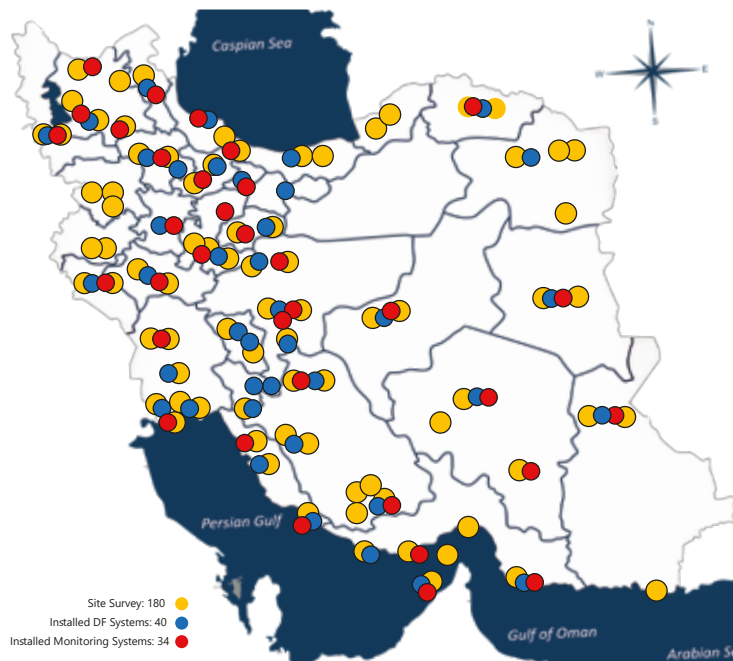
## Customer Support & Services

- Site search services
- Long-term service contracts
- Equipment and spare parts supplement
- Launching the status monitoring system
- Consultation and technical support
- Technical site visits
- Equipment installation on the site
- Hardware and software updates
- Maintenance services on the site



### Some other projects, developed and implemented by FARAZ In IRAN

- Research and development of a National RF Regulatory System for CRA of Iran
- Research, development, and production of customized Direction Finder (DF) Systems
- Research, development, and production of customized Bandwidth Monitoring Systems
- Total 180 site surveys all over the country
- 40 Installed DF systems
- 34 Installed bandwidth monitoring systems
- Full maintenance and support services all over the country



# Information and Communication Technologies and Services



+9821 8887 8651-3  
+98 919 824 5923 (CRM)

[info@farazcomm.com](mailto:info@farazcomm.com)  
[www.farazcomm.com](http://www.farazcomm.com)

Headquarters: No. 2, Manafi Alley, Shams Lahijani St., Brazil St., Vanak Sq., Tehran, Iran  
Factory: No. 69, 6th Alley, Dr. Abidi Blv., Lashkari Exp., Tehran, Iran