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IRAN
COMMUNICATIONS
INDUSTRIES

# Cellular Communication

## About IEI (Iran Electronics Industries)

Iran Electronics Industries (IEI) as the largest company in the fields of Electronic, Telecommunication, Defensive and Commercial Electro optics in the country meanwhile, industrial and technical interactions with more than 170 technological companies and establishment of 14 technological joint centers with domestic authentic universities, provides types of electronic products and services such as Radar, Electronic Warfare (EW), IT, Secure and Reliable Communication, Optics and Laser, Cyber defensive, Electronic Components, and required Space Systems for military forces and defensive industries in order to establish and increase the deterrent power and defense.

## About ICI (Iran Communications Industries)

Iran communications industries (ICI) affiliated to Iran Electronics Industries (IEI) was established in 1972 with more than 35 years of credible reputation directed to manufacture diversity of communication means and participate in all international tenders with over 1000 skilled and educated personnel and lustrous background of successful experience is the main producer and designer of military/ paramilitary communication equipment and total solution in Iran and middle east.

The principal mission of ICI is researching, designing and manufacturing various types of communication systems in military/non- military fields; as well as designing and implementing total solutions such as EW, C4I, jamming networks and ECCM systems in order to establish a stable, secured and flexible communication with a suitable capacity and also developing and open architecture radio waveform technology that allows multiple radio types to communicate with each other with the goal of meeting diverse communications through the latest and state of art technology communication means & networks.

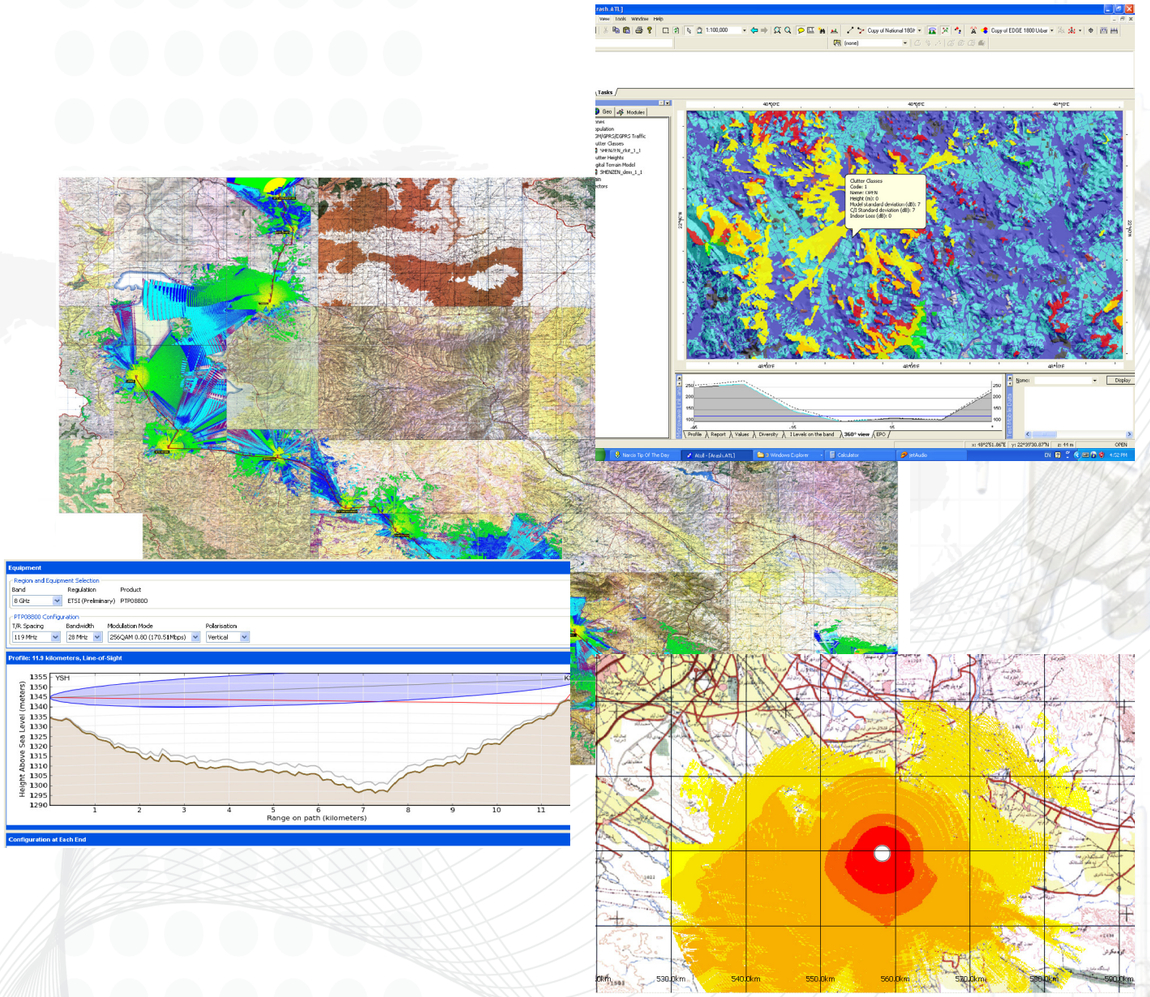
Also ICI has the capability of repairing, renewing, manufacturing and assembling different types of communication means, as well as providing after sales services and technical consulting to have a continual improvement and development.

Effective presence and implementing national projects in the fields of communication with the cooperation of IN/OUT companies and exporting various kinds of communication products, technical engineering services to foreign countries are important pace in renewing and developing our national industry.

Concentrating on time, cost and quality management, developing human resources, and staff motivation are our main purposes.

**Contents**

# Radio Coverage Analyzing System



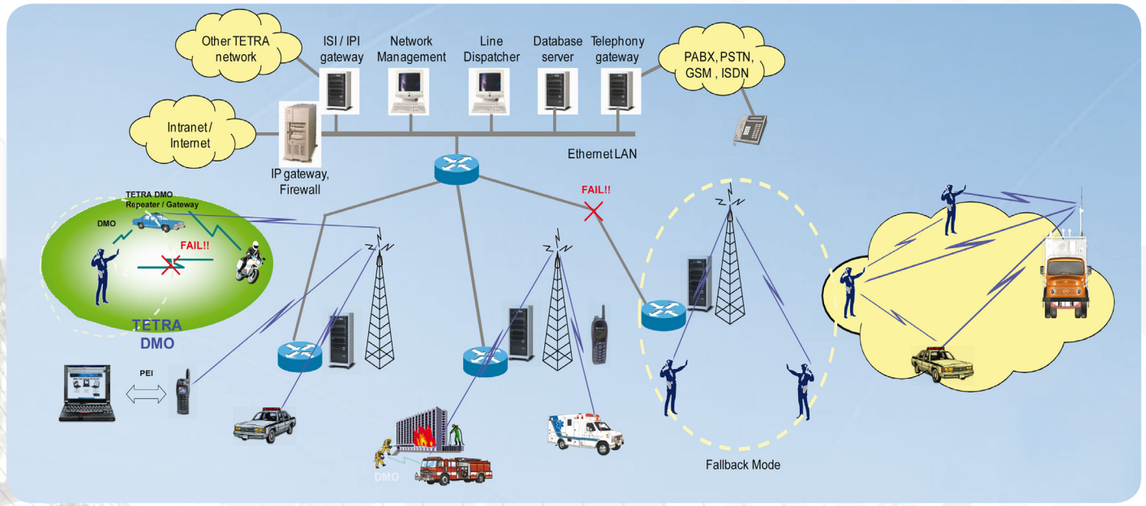

Because of increasing air traffic and developing radio communication and as a result accumulation in electromagnetic spectrum, planning and optimizing radio networks and operating control systems are very important. The most important considerable aspects are limitation in frequency spectrum, maximum coverage, and minimum interference. Therefore, powerful analyzing and calculating tools are needed to design airborne radio network.
In order to estimate radio coverage for the UHF/VHF GSM and LTE systems and radio links, Asset, Atoll, and UV Plannet are considered as proper software.

- Interference recognition
- Coverage determination
- Frequency allocation
- Radar coverage
- Link performance determination
- Spectrum display
- Information management





# TETRA Trunk Network




TETRA Trunk Network is provided for establishing digital data/voice selective and Group communications. Due to the repeaters and mobile base stations, these networks are very flexible. Therefore, reliable infrastructure can be developed possibly for military organizations and emergency divisions. This network includes manual/vehicular terminals and base stations.

## Capabilities

✓ TETRA standard
✓ AVL, monitoring operations and GIS
✓ Capability of prioritizing the subscribers and services (15 priority levels)
✓ Establishing communication with internal, civil, and military communication networks (such as PABX, PSTN, and GSM) and conventional radio network
✓ Individual management layers
✓ Available standard equipment of the network such as switches and routers
✓ Audio services
  - Group calls
  - Selective calls
  - Telephone calls (PABX/PSTN)
✓ Data and message sending services
  - SDS (Short Data Services)
✓ Security service
  - Identification (individual and interactive)
  - Air-interface encryption (TEA1, EA2,TEA3, and TEA4)
  - End-to end encryption
  - Access to the PIN and PUK codes
  - Security classes 1, 2, and 3
✓ Operator safety
✓ Location based services
  - Internal GPS system
  - Setting the LIP (Location Information reporting) service
✓ Loud and clear voice
✓ Establishing a very flexible and efficient network
✓ High frequency efficiency (4 channels in 25KHz bandwidth)
✓ Increasing battery life time in the terminals
✓ Automatic call switching between the cells
✓ Programming different parameters via computer in the terminals and base station
✓ Capability of selecting the model along with the GPS module and without the module in the terminals
✓ Supporting Farsi language and other world live languages in the terminals
✓ Capability of Software updating the network directly via the IP network

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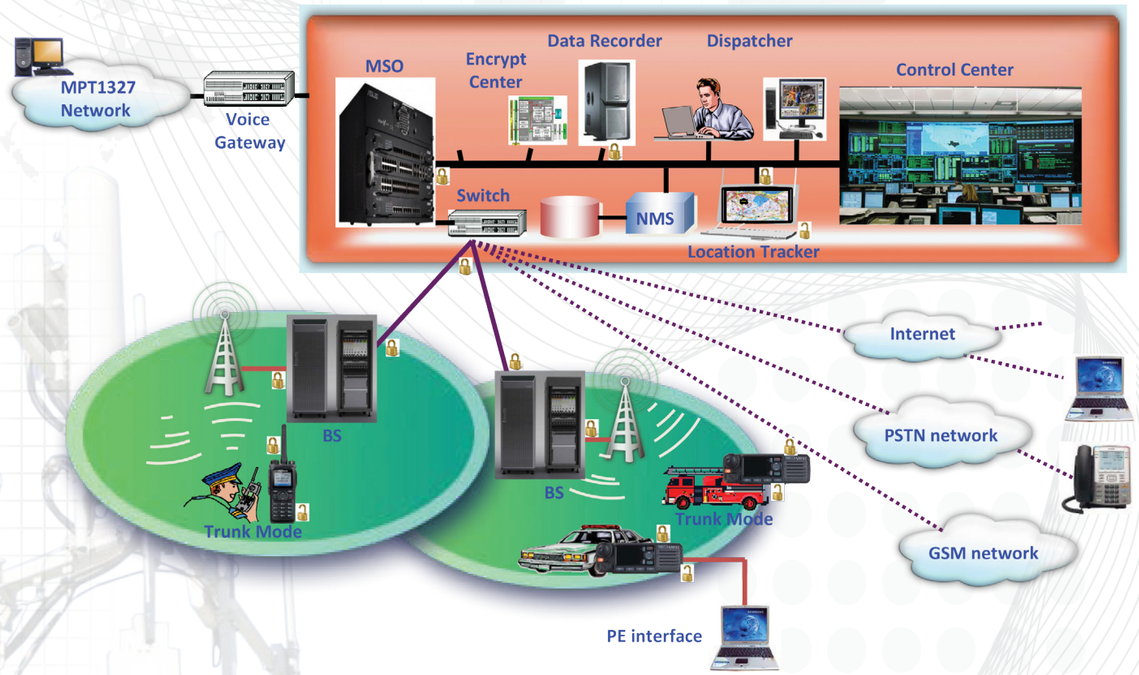
# Digital Trunk Network

## General specifications

Maximum number of base stations.....50
Maximum operator's capacity.....16
in each base station
Number of the operators.....50000
Capacity of the group call.....5000
Capacity of the Dispatcher system.....200
Capacity of the NMS terminal.....64
Connecting to the MPT network.....10
(number of gateways)
Connecting to the PSTN network.....60 (2×E1)
(number of gateways/channels)
Time of establishing the group call (ms).....< 360




DTN-910 Digital Trunk Network designed considering the ETSI DMR standard is a digital Trunk infrastructure system based on the IP network. It is designed especially for establishing integrated audio network, capacity distribution and management between several different geographical zones in missions and critical conditions. Due to the Trunk network updating capability and its flexibility, establishing a secure and economical infrastructure for organizations and emergency divisions is possible.

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# PT-580H TETRA Handheld Radio Communication System


## General specifications

Frequency range.....380-430 MHz - 410-470/806/870 MHz
Battery.....1800mAh Li-Ion
Voltage.....7.4 V
Maximum power of output voice.....1W

## TX/RX specifications

RF channel band width.....25 KHz
RF output power.....3W/1.8W (for 806-870MHz)
Power precision.....±2dB
RX static sensitivity.....-112dBm (typical -116 dBm)
RX dynamic sensitivity.....-103dBm (typical -105 dBm)
GPS sensitivity.....≤ -154dBm signal tracking - ≤ -138dBm receiving
GPS precision.....hot start up < 10s - Cold start up < 50s

## Environmental and mechanical specifications

Dimensions.....12x5.4x3.5 cm (W×D×H)
Weight.....348 gr. (with battery and antenna)
Storage temperature.....-25 to 65 °C - -40 to 85 °C
Humidity.....ETC 300 019 (95%@25 C@25)
Protection against water and dust.....IEC60529, IP67
Shock, vibration.....MIL-STD-810 C/D/E/F/G

This radio is used in TETRA cellular network for voice and data communication. The radio should be registered in the network and then the communication will be established via base stations. Beside connecting to TETRA cellular network (TMO mode) this radio could be connected to other conventional radios directly in DMO mode. The connections could be established via dialing or pressing PTT, duplex or half duplex.

# MT-680 TETRA Vehicular Radio Communication System


This radio is designed for installing in vehicle to establish communication in TETRA network in two modes of direct (DMO) and trunk (TMO). High reliability and easy operation are main features of the radio. In direct mode, output power of the radio is 10W which covers a wide range. In trunk mode the radio covers a vast range of facilities in the network. 4W output, TETRA voice and SMS services, high precision GPS, ciphered voice communication, and fast access to the TETRA network are some facilities of the radio.





## General specifications

Frequency range.....380-430 MHz/410-470 MHz
Operating voltage.....10.8-15.6V (typical values 13.2V)

## TX/RX specifications

RF channel band width.....25 KHz
RF output power.....10W
Power precision.....±2dB
RX static sensitivity.....-112dBm (typical -116 dBm)
RX dynamic sensitivity.....-103dBm (typical -105 dBm)
GPS sensitivity.....≤ -154dBm signal tracking- ≤ -138dBm receiving
GPS precision.....hot start up < 10s - Cold start up < 50s
Output audio.....4W (internal), 10W (external)

## Environmental and mechanical specifications

Dimensions.....18.4×20×70 cm (W×D×H)
Weight.....1900g
Storage temperature.....-25 to 65 °C - -40 to 85 °C
Humidity.....ETC 300 019 (95%@25 C@25)
Protection against water and dust.....IP54 (main unit), IP67 (front panel) - IEC60529 or GB-4208-93
Shock, vibration.....MIL-STD-810 C/D/E/F/G

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# IPD42(G) DMR Handheld Radio Communication System


IPD42(G) civil handheld radio is new generation of civil radios under the DMR Tier II/III standard. This radio is operated in the civil radio networks as a handheld radio. Using repeater, radio coverage range of these radios can be increased. Benefitting from the two analogue and digital modes, communication is established between the IPD42(G) and old analogue networks. In addition, operating this radio set, private/group communication can be established as well as SMS sending and data transmission. Large size of display screen, keypad with capability of defining the short keys, supporting the 12.5/20/25 KHz, 1024 preset channels, scanning the channels, defining high/low power levels and setting the short keys, high receiving sensitivity, meeting international standards, dual-purpose antenna for the GPS and wave transmission, and capability of selecting the GPS as an optional facility are other features of the IPD42(G).

## General Specifications

| | |
|---|---|
| Frequency range | UHF: 350~400 MHz/400~470 MHz/450~520 MHz<br>VHF: 136~174 MHz |
| Number of channels | 1024 |
| Zone capacity | 64 (each zone with maximum 16 channels) |
| Channel spacing | 12.5KHz/20KHz/25KHz |
| Frequency stability | ±1.5ppm |
| Antenna impedance | 50Ω |

## Receiver Specifications

| | |
|---|---|
| Analogue sensitivity | 0.3μV (12dB SINAD)<br>0.22μV typically (12dB SINAD)<br>0.4μV (20dB SINAD) |
| Digital sensitivity | 0.3μV / BER5% |

## Transmitter Specifications

| | |
|---|---|
| RF output power | UHF: Low Power: 1W/High Power: 4W/adjustable<br>VHF: Low Power: 1W/High Power: 5W/adjustable |
| Analogue modulation type | FM |
| Digital modulation type | 4FSK |
| Audio distortion | ≤3% |
| Audio response | +1 ~ -3dB |
| Voice compression | SELP |
| Digital protocol | ETSI-TS102 361-1,-2,-3 |

## Physical and Environmental Specifications

| | |
|---|---|
| Weight | 355gr |
| Dimension (H×W×D) | 128×55×35 mm (with standard battery and without antenna) |
| LCD dimension | 1.8 inch, 4 rows |
| Operating temperature | -30°C ~ +60°C |
| Storage temperature | -40°C ~ +85°C |
| Standards | MIL-STD-810 C/D/E/F/G and IP67 |

# IMD52(G) DMR Vehicular Radio Communication System

IMD52(G) civil vehicular radio is new generation of civil radios under the DMR Tier II/III standard which is used for covering and establishing reliable high quality communication in each level of organization. This radio is operated as a vehicular/stationary radio to exchange vital and online information. High-quality voice transmission due to available Codecs and digital error correction processes, best-quality voice in noisy circumstances and borders of network radio coverage, supporting digital and analog modes, SMS sending/receiving, establishing private/group/broadcast/emergency communication, establishing encrypted communication due to encryption technology of the radio in digital and analog modes, reliability and excellent quality, benefitting from the GPS module optionally and capability of observing geographical location, different expanding ports, large size and color display screen, keypad for different functions (such as SMS sending/receiving and changing the radio parameters), and defining short keys are some technical feature of the IMD52(G) radio set.





## General specifications

Frequency range.....UHF: 350~400 MHz/400~470 MHz/450~520 MHz
VHF: 136~174 MHz
Number of channels.....1024
Zone capacity.....64 (each zone with maximum 16 channels)
Channel spacing.....12.5KHz/20KHz/25KHz
Frequency stability.....±1.5ppm
Antenna impedance.....50Ω

## Receiver specifications

Analogue sensitivity.....0.3μV (12dB SINAD)/0.22μV typically (12dB SINAD)/0.4μV (20dB SINAD)
Digital sensitivity.....0.3μV / BER5%

## Transmitter specifications

RF output power.....UHF: 5~45W (adjustable)\VHF: 5~50W (adjustable)
Analogue modulation type.....FM
Digital modulation type.....4FSK
Audio distortion.....≤3%
Audio response.....+1 ~ -3dB
Voice compression.....SELP
Digital protocol.....ETSI-TS102 361-1,-2,-3

## Physical and environmental specifications

Weight.....1.7Kg
Dimension (H×W×D).....600×174×200 mm (with standard battery and without antenna)
LCD dimension.....2 inch, 4 rows
Operating temperature.....-30°C ~ +60°C
Storage temperature.....-40°C ~ +85°C
Standards.....MIL-STD-810 C/D/E/F/G and IP67

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# IPD43(G) DMR Anti-Explosive Handheld Radio Communication System

## General specifications

Frequency range (UHF).....400-470 MHz+136-174 MHz
Number of channels.....1024
Zone capacity.....64 (each zone,16 channels)
Channel space.....12.5/20/25 KHz
Frequency stability.....±1.5ppm
Antenna impedance.....50 ohm

## RX specifications

Sensitivity.....0.3μV (12dB SINAD)
0.22μV (12dB SINAD) (typical)
0.4μV (20dB SINAD)
Digital sensitivity.....0.3μV / BER5%

## TX specifications

RF output power.....1W
Type of analog modulation.....FM modulation
Type of digital modulation.....4FSK digital modulation
Audio distortion.....≤ 3%
Audio response.....1 ~ -3dB
Voice compression.....SELP
Digital protocol.....ETSI-TS102 361-1,-2,-3

## Environmental and mechanical specifications

Dimensions (without antenna).....14x5.5x4.9 cm (W×D×H)
Weight.....495g
LCD dimensions.....1.8 inch, 4 rows
Operating temperature.....-30 to +60 °C
Storage temperature.....-40 to +85 °C
Subjected to.....MIL-STD-810 C/D/E/F/G and IP67
ATEX/IECEx/FM/CSA/CQST IIC certificated

This radio is the new generation of ATEX radios.

IPD43(G) is designed upon the strict requirements of European ATEX and north American FM standard. The radio works safely in most hazardous environment.

# IRD62S Mobile Radio Repeater


IRD62S mobile radio repeater as center of a cell in the single-sight/multi-sight radio network under the DMR Tier II standard with capability of high reliability and analogue/digital facilities is proper to establish an advance full digital communication. This repeater can be operated in both analogue and digital modes whereas, it is compatible with available analogue networks. Based on type of the received signal, IRD62S switches between analog and digital modes automatically. Many requirements of the operators are met due to high output power of the repeater (50W). Installing this repeater inside the 19” racks easily, establishing secure communication due to software encryption process, powerful cooling fan, establishing radio network and communication with the other repeaters based on the IP network are other advantages of the IRD62S. On the whole, in civil radio networks, rack-mount digital repeater is considered to establish reliable and high quality communication for covering more operators and exchanging vital and online information.



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## General specifications

Frequency range.....UHF: 350~400 MHz/400~470 MHz/450~520 MHz
VHF: 136~174 MHz
Number of channels.....16 channels
Channel spacing.....12.5KHz/20KHz/25KHz
Operational voltage.....13.6V ± 15%
Current consumption.....receiving: <0.8A, transmitting: <11.0A
Frequency stability.....±0.5ppm
Antenna impedance.....50Ω

## Receiver specifications

Analogue sensitivity.....0.3μV (12dB SINAD)
0.22μV typically (12dB SINAD)
0.4μV (20dB SINAD)
Digital sensitivity.....0.3μV / BER5%

## Transmitter specifications

RF output power.....UHF: 5~45W (adjustable)/VHF: 5~50W (adjustable)
Analogue modulation type.....FM
Digital modulation type.....4FSK
Audio distortion.....≤3%
Audio response.....+1 ~ -3dB
Voice compression.....SELP
Digital protocol.....ETSI-TS102 361-1,-2,-3

## Physical and environmental specifications

Weight.....8.5Kg
Dimension (H×W×D).....88×483×366 mm
LCD dimension.....2 inch, 4 rows
Operating temperature.....-30°C ~ +60°C
Storage temperature.....-40°C ~ +85°C
Standards.....MIL-STD-810 C/D/E/F/G

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# IRD63P Portable Radio Repeater

## General specifications

| | |
|---|---|
| Frequency range (UHF) | 350-400 / 400-470 |
| Frequency range (VHF) | 136-174 MHz |
| Number of channels | 16 |
| Channel space | 12.5/20/25 KHz |
| Operating voltage | DC: 13.6V ±15%, Battery: 14.8V |
| Current consumption | RX: <3.5A, STBY: <0.8A |
| Battery | 10Ah (Li-Lon) |
| Frequency stability | ±0.5ppm |
| Antenna impedance | 50ohm |

## RX specifications

| | |
|---|---|
| Sensitivity (analog) | 0.3μV (12dB SINAD)<br>0.22μV (12dB SINAD) (typical)<br>0.4μV (20dB SINAD) |
| Digital sensitivity | 0.3μV / BER5% |

## TX specifications

| | |
|---|---|
| Output power | 1-10 W (adjustable) |
| Type of analog modulation | FM modulation |
| Type of digital modulation | 4FSK digital modulation |
| Audio distortion | ≤ 3% |
| Audio response | 1~-3dB |
| Voice compression | SELP |
| Digital protocol | ETSI-TS102 361-1,-2,-3 |

## Environmental and mechanical specifications

| | |
|---|---|
| Dimensions (without antenna) | 30x18x5cm (W×D×H) |
| Weight | 3.5Kg |
| Operating temperature | -30 to +60 °C |
| Storage temperature | -40 to +85 °C |

The portable repeater IRD63P is a new generation of civil digital repeaters in DMR Tier standard which operation is very easy due to integrated design and embedded duplexer. This repeater could be used in manpack, wall-mounted and rack-mounted modes; also is compatible with various types of power supplies. GPS facility (optional), 10Ah Li-Ion backup battery (optional), voice and data transmission, IP-base communication are some of technical features of the repeater.

# IX1p DMR Handheld Radio Communication System

IX1p handheld radio communication system is a small digital radio set as new generation of the civil tiny managing radios operated in special and secret applications, hospitals, fire stations, and … where the radio should be hidden. This radio is the smallest radio in the world with very small size and very low depth (21mm). Transmitting low capacity voice/data is one of the main functions of this secret handheld radio communication system. Other capabilities of this digital radio are high receiving sensitivity, meeting international standard, two-purpose antenna for both GPS and wave propagation, and selecting the GPS module included type and without the GPS, large colored display screen and keypad for benefiting from the digital system facilities such as SMS sending and …, channel scanning, capability of defining high and low power levels and setting the short keys, operations in two digital and analog statuses, supporting the Bluetooth and Bluetooth hands-free technologies for the operators in special conditions.





# SVRC H-125 HF Radio Communication System

This type of radio can be used for stationary and vehicular operations. This system can support more than 1KW power amplifiers for data and facsimile applications.

## Capabilities

- ✓ Easy installation
- ✓ Selective call in emergency conditions
- ✓ High dynamic receiving range
- ✓ Controllable with computer
- ✓ Remote troubleshooting
- ✓ ALE
- ✓ Built-in test equipment
- ✓ Conversation facilities

## Accessories

- ● Remote control interface
- ● Data modem
- ● Power supply
- ● High RF power (500W and 1KW)
- ● Vehicular/stationary antenna along with the ATU (125W and 1KW)

# ICS-911 Integrated Communication System

Due to integration by this system, gaining access to 10 radios, 8 PSTN lines, and 16 internal telephone lines is provided remotely. Using the system, communication equipment of an infrastructure can be controlled remotely from up to 20km distance via a set of fiber optic. This system is operated for establishing without propagation infrastructures so that antennas and radios can be located far from the communication infrastructure using the system.

## Capabilities

- ✓ 16 internal lines
- ✓ Equipped with the Soft Phone
- ✓ Remote management and observing
- ✓ Capacity of connecting to 10 radios
- ✓ Capacity of connecting to 8 PSTN lines
- ✓ Ethernet information transmission (voice, data, and video)
- ✓ Establishing the Hot-line communication and intercommunication between the consoles
- ✓ Capability of connecting to computer and laptop as the operational console
- ✓ Equipped with systematic alarms for the Self-test
- ✓ 180-240VAC power supply of the system including the UPS with capacity of one hour supply in emergency





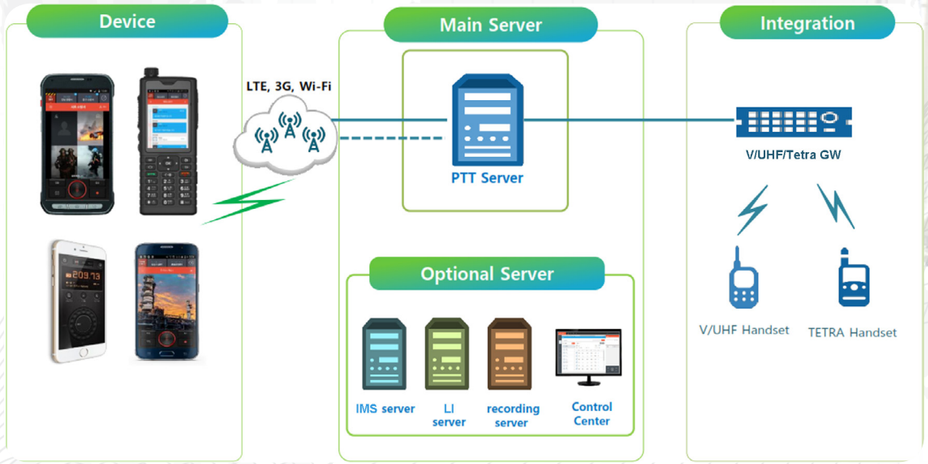
# PTT over Cellular (PoC)

Push to talk over Cellular (PoC) is a wireless two-way cellular communication allowing instant and global mobile connectivity with the ability to communicate on a push of a key.
Push to talk over cellular uses the push to talk communication (PTT) principle, where receiver does not need to answer the call as there is always active connection between two individuals or group. The communication can be started on a push of a key one user at a time.
PoC combines push-to-talk (PTT) operational advantages with interference immunity and other mobile phone advantages. For example, PoC uses half-duplex communication (only one call may be transmitted by a user) and one call may be received by one or more users. This feature is more useful when single user wants to talk to a group without making multiple calls.
Full-duplex communication was traditionally applied to mobile networks and devices, which required connection using a dialed phone number or an answered call. This connection was active until the call ended or the connection failed from a signal loss.

## Main Features

- ✓ Voice/video PTT based on MCPTT standard
- ✓ Voice/video VoIP Call
- ✓ Voice/video Group Call
- ✓ Conversion (Video/Voice)
- ✓ Multicast (eMBMS)
- ✓ SMS/Image Video Transmittal
- ✓ Emergency Call
- ✓ Multi group Call
- ✓ Recording Voice/Video

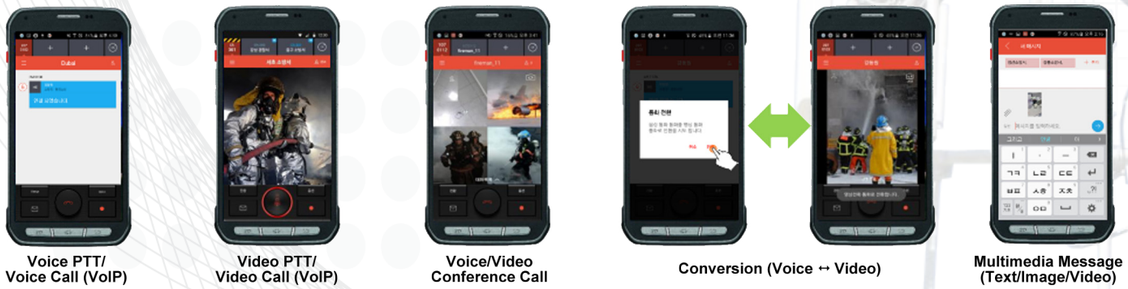
## System Composition




## Server Components

- ● PTT server
- ● IMS server
- ● LI server
- ● Control Center
- ● Audio/Video Recording
- ● V/UHF/Tetra G/W

## Device Applications



Voice PTT/ Voice Call (VoIP) | Video PTT/ Video Call (VoIP) | Voice/Video Conference Call | Conversion (Voice ↔ Video) | Multimedia Message (Text/Image/Video)





# Self-Propelled Mobile BTS System

Self-propelled mobile BTS system is designed and manufactured for communication coverage of the GSM/3G/4G networks.

## Main parts of the system:

- ● Communication container
- ● 6-ton truck
- ● 18m electrical/winch mast (minimum length of 3.2m)
- ● BTS/battery rack
- ● 15KVA power generator
- ● Electrical jack for disconnecting the container
- ● Mast holder
- ● BTS antenna

## Capabilities

- Vehicular/stationary operation
- Vertical installation of the mast and BTS antenna for easy operation and setting up
- Operating with power generator and Mains power supply
- Quick installation and setting up
- Light weight container using sandwich panel and strengthened structure
- Installing on a 6-ton truck for easy traffic
- Electrical jack for disconnecting the container from truck and installing it on the ground or vice versa
- Winch mast with high load tolerance up to 800kg, about 4m2 FPA, minimum weight of about 750kg, and power of erecting with up to 600kg weight
- Special stainless and anti-theft fittings
- Operating in different climatic/environmental conditions
- Ergonomic design
- Easy access to the container equipment via its all sides
- Quick lock for easy disconnecting the container from truck
- Metallic fan
- Light system
- Equipped with trestle to prevent the jacks from over load
- Fuel backup tank of power generator
- Accommodation for the guard (tent, light, parasol, tool box, first aid kit, fire extinguisher, and …)





## Technical specifications

Rotation angle.....1000 ± 100 kg Without indoor equipment
(tolerable equipment weight: one ton)
Dimension.....W=2.5m, L=2.5m, H=2m
a slope of about 4% is considered from door side to rear side of the container for rain flow
Material.....main structure of the container is structural steel (a combination of profile, angle bar, angle strength plates, and …)
Container's wall.....consists of sandwich panels with injected foam (polyurethane foam with 40kg/m3 density) as heat/sound/humidity insulator
Air condition system.....heating/cooling (split and condenser)
.Standard color.....according to the customer's request (resisted against environmental factors)
Tolerable wind speed.....160km/h
Operating temperature.....-40°C ~ +80°C
Storage temperature.....-50°C ~ +90°C
Environmental standard.....IDS-810
Stablishing on the ground/vehicle
Resisted against dust and sand
Resisted against plants, rodents, termites, and …
Resisted against rain, snow, hail, and …
Expected life time: 20 years

## BTS Container

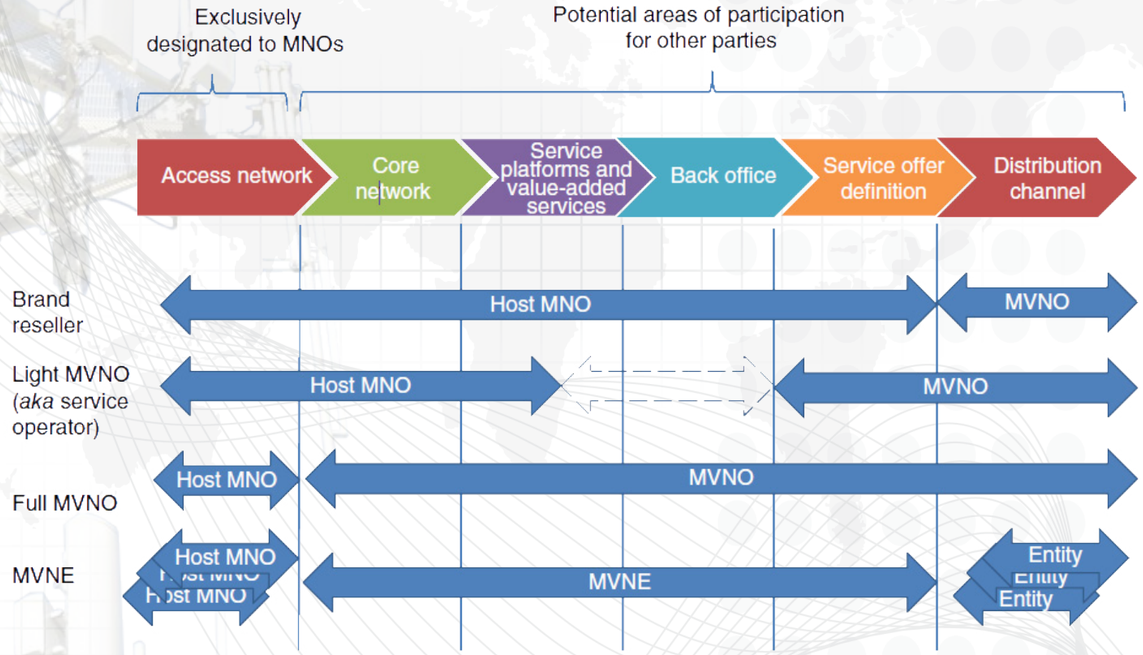
In order to install communication equipment inside a system and transporting it to different centers with several applications, these types of containers are considered. In addition, they are used where constructive operations cannot be accomplished or is not economical.

BTS communication containers are designed according to the customer's required dimension and technical specifications as well as considering their indoor arrangement of equipment.



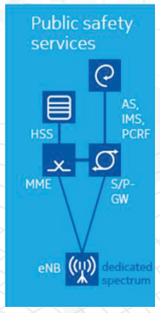
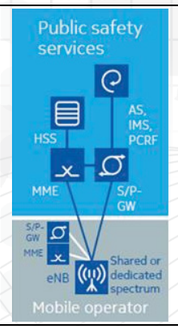
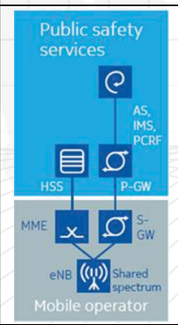
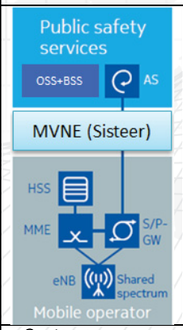
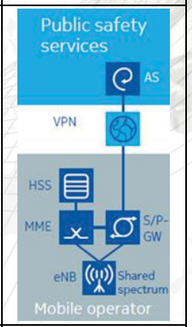


## Secure-Mobile Virtual Network Operator (S-MVNO)




Activity field of virtual operators includes a wide range, but on the whole, the operator does not invest in in the Radio Access Network (RAN) and uses the RAN of one or more Main Network Operators (MNO) in the country. Virtual operator concentrates on Core Network and invests in it. A parts of the MVNO range includes the operators that presents their private SIM cards without any private infrastructure (Light MVNO). In addition, Full MVNOs including radio infrastructures and other sections of mobile communication network (Core Network Equipment) privately/independently are a part of the range. It is evident that variety of virtual operator's services depends on number of its private infrastructure equipment. In this case, managing the subscribers, security and security control, Quality of Services (QoS), and pursuing the related policy is performed by virtual operator.

Various MVNOs and accomplished Access Point Name (APN) are described in the following table briefly.

| Network Type | Private Network | Full MVNO MOCN | Full MVNO GWCN | Light MVNO | APN |
|---|---|---|---|---|---|
| Conceptual Structure |  |  |  |  |  |
| Structure Description | - It is a complete operator.<br>- Private network including Core and Access parts is available. | - In this status, all of the Core nodes are available in the MVNO and using radio part of different MNOs from various operators can be accomplished. | - Most of the Core important nodes especially data base of subscribers except control nodes are available in the MVNO. | - Customer interconnects with MVNE (Mobile Virtual Network Enabler) instead of the operator.<br>- Billing and charging management and interconnecting with subscribers are in customer's network side. | - Core, transmission infrastructure, and access are in operator's side.<br>- Customer has only its applicable servers (VoIP Server, POC Server, and …) |



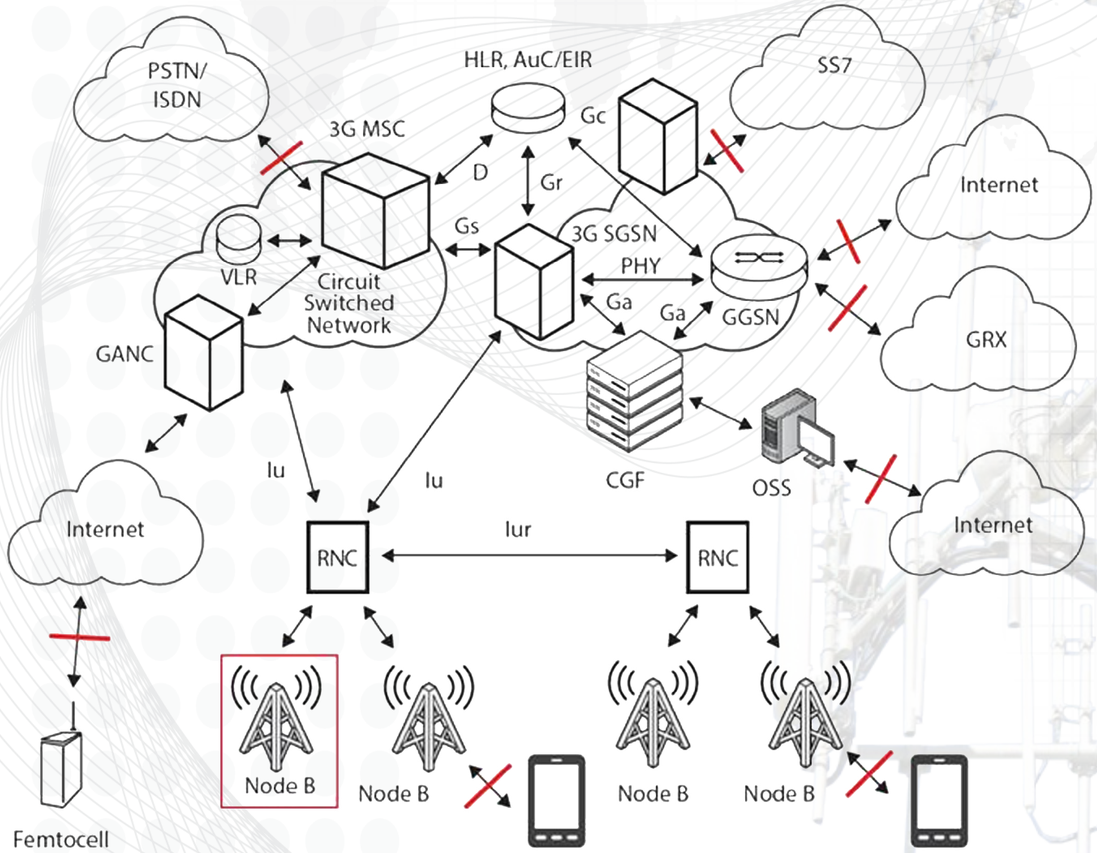


# Mobile Network Security

Nowadays mobile networks are the most dynamic part of critical communication infrastructures and the key instrument used to perform daily activities ranging from voice and text messaging to providing signaling for emergency services and critical infrastructure. Regardless of what security assurances mobile network operators provide, there is plenty of hard evidence that in fact shows how vulnerable these systems are. Lately, it seems like a common occurrence when private telephone conversations or pictures of government officials, celebrities and business leaders appear on the Internet, even though these individuals usually take extra precautions when it comes to their personal privacy and safety. In many instances, a common misconception is that security breaches like these are very complicated and expensive to execute and can only be accomplished by high-ranking security intelligence agencies, organized crime or the most sophisticated hackers. This perception is understandable, since most people are trained to view a mobile communication network as a system made up of only the most cutting edge technologies. However, in reality a telecommunications network is a complex system built on subsystems that each have different technological levels, with the security of the whole network usually defined by the security level of the weakest link.

## Security Services

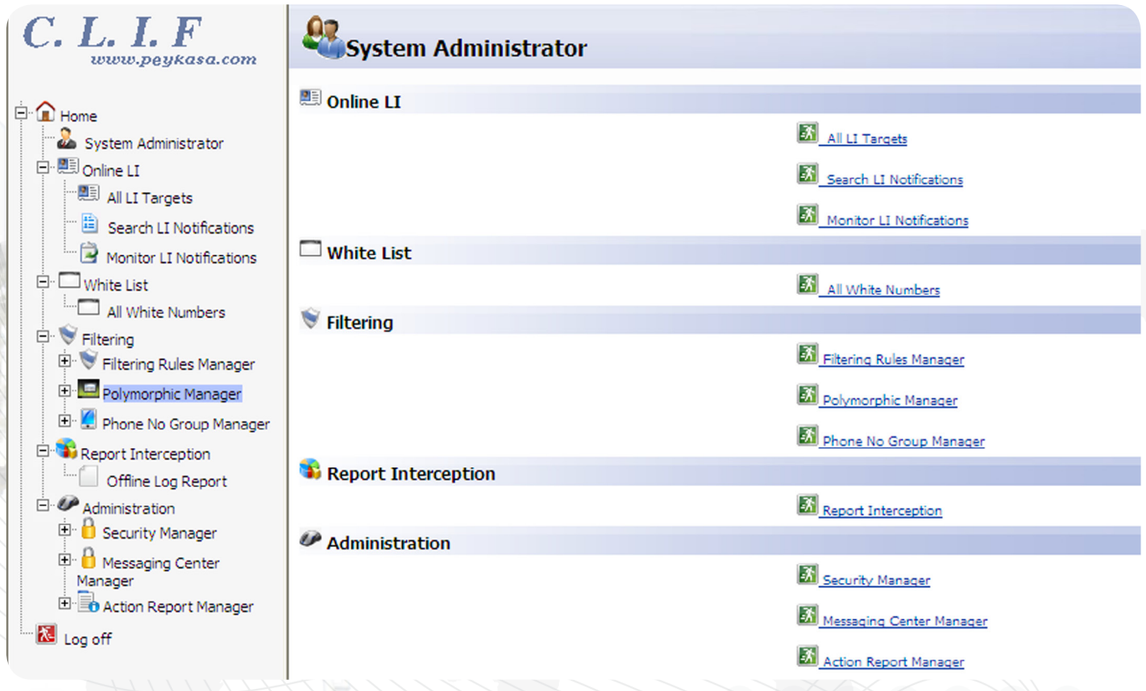
- ✓ Security consulting on 2G (GSM, GPRS, EDGE), 3G (UMTS), 4G (LTA, LTEA) and 5G networks.
- ✓ Security analysis, evaluation and preparation-testing of mobile networks (RAN, CS-Core, PS-Core, …)
- ✓ Securing mobile value- added services (VAS)
- ✓ Consultation/implementing of security maturity models for the mobile network operators
- ✓ Fraud and anomaly detection services based on user behavioral analysis using our software product
- ✓ Securing mobile networks based on Big-data approaches
- ✓ Implementing mobile emergency response teams (MERT) for mobile network operators
- ✓ Professional trainings and workshops on cellular network security
- ✓ A brief Proposal of “Securing 3G and 4G Networks”





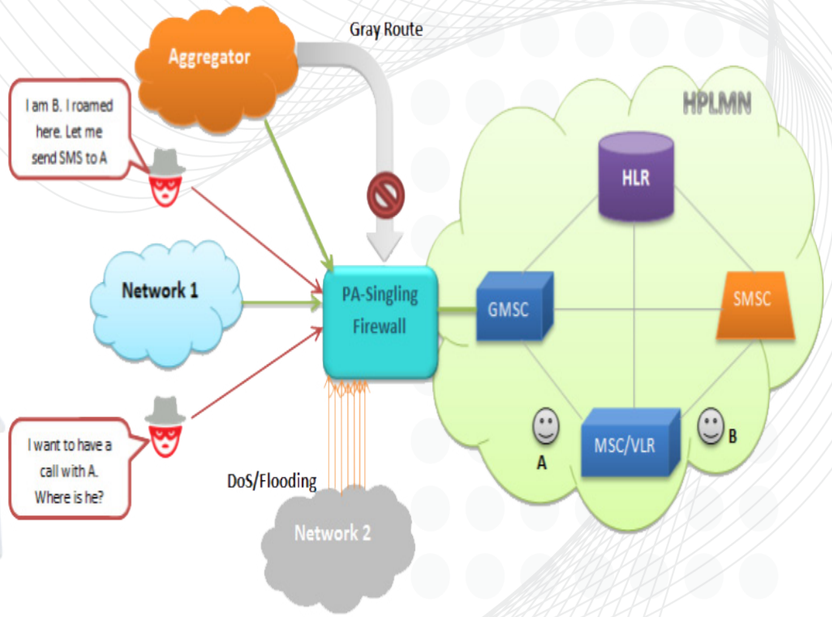



## CLIF (Central Lawful Interception & Filtering)



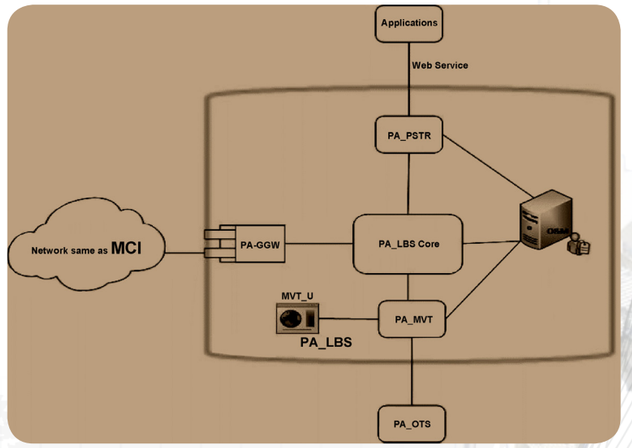

As the name implies using this product you can perform lawful interception of SMSs in Mobile Networks. In addition to interception, you can filter and change messages based on your defined criterias.

- All LI Targets
- White List
- Filtering
- Report Interception
- Administration



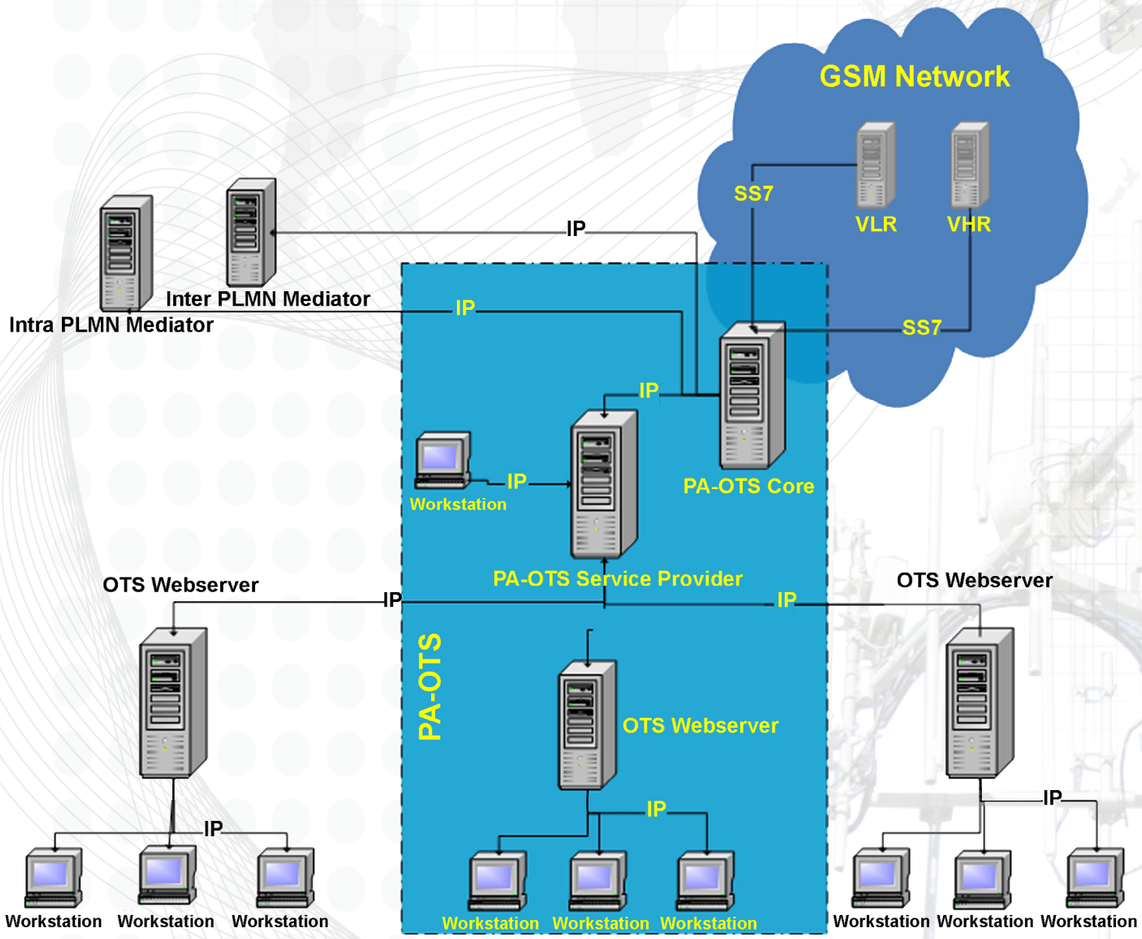
## LBS (Location Base System)

- Subscriber tracking
- Send SMS in the specified location
- Change SMS location




## OTS (Online Tracking System)

In the GSM network, the task of maintaining location information of subscribers, i.e. LAC and Cell ID, is responsible of HLR and VLR nodes.





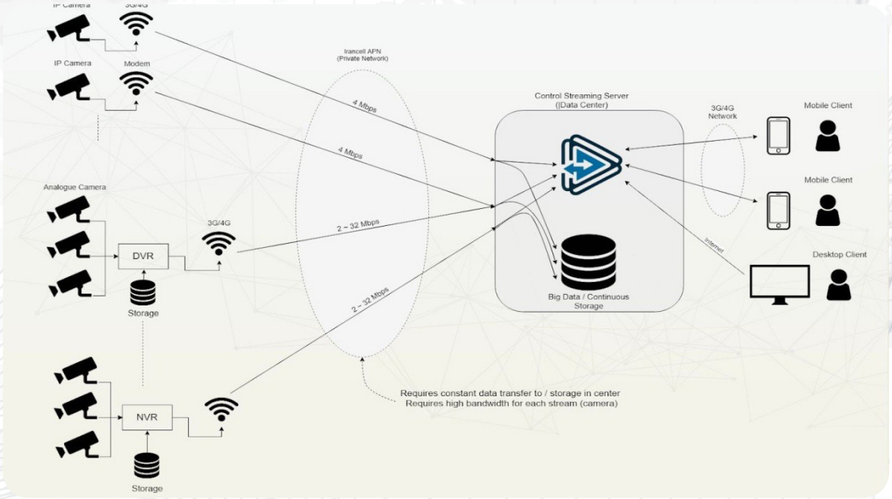



# Video Surveillance As A Service (VSAAS)

Considering the ICI's integrated video transmission solution and benefitting from secure private data network of mobile phone operator, video of the places under the CCTV coverage can be observed every time by organizational subscribers permanently, reliably, and securely using advanced surveillance equipment accepted by reference institutes.

## Advantages and Features

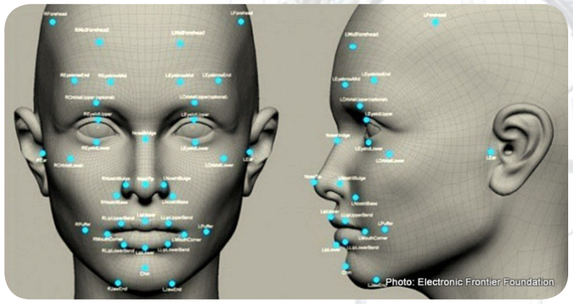
- Easy/quick setting up the service
- Benefitting from secure private data network in mobile phone operator's coverage for transmitting videos independent from internet network especially in places where access to other video transmission equipment is impossible, does not have easily, takes much time, or is expensive and or communication infrastructure is not available there.
- Comprehensive video observation, independent from the CCTV brand and technology (integrating all technologies and brands of the CCTV)
- Adaptive Bitrate
- Concentrated operator account management such as operator definition, access determination, operator log files, and … via the web console
- Video monitoring via customized software with capability of supporting specialized video surveillance monitors e.g. Video Wall




- Face detection

Nowadays data analytic and data mining is an expensive and impossible process with massive video data. Face detection framework analyzes video content deeply based on AI and deep learning. Modules and features of face detection are as follows:

- ✓ Face detection and recognition
- ✓ Sign, logo, and symbol detection and recognition
- ✓ Text and number detection
- ✓ Forbidden and +18 video content detection and recognition
- ✓ Object detection
- ✓ Video similarity detecting








# 4th Generation of Local Mobile System (LTE-NIB)

- Local product
- All of the LTE (Long Term Evolution) network main parts such as eNodeB, EPC, Core, and … are located in a case (Network In a Box)
- All equipment meets international standards of mobile network (LTE Release 12.0)
- Each system is a complete LTE network
- Mobility and integrated network
- Meeting the 3GPP Release 9 & 10 international standards
- Interconnection networking with the same type systems
- Communication with the PABX, PSTN, and VOIP centers
- FDD and TDD operation modes and supporting frequency range of 400 ~ 3000 MHz
- PTT and MCPTT services through the LTE infrastructure as MidWare
- Extendable
- Supporting up to 256 operators simultaneously
- Data service with high bandwidth
- Voice/video communication via the MDS
- Implementing the CS-Fall Back and (VoLTE IMS) in new versions
- Implementing end-to-end encryption in terminals
- Unlimited supporting due to the local product

Cellular Communication

# LTE FDD (Frequency Division Duplex) Modem

## Technical specifications

VPN Pass-through support.....(PPTP, L2TP & IPsec)
Support 4G.....FDD LTE B3/7 3G:B1
LTE speed.....CAT4 UL 150Mbs  DL 50 Mbps
LTE antenna efficiency.....>80%
LTE peak gain 3dbi
Wifi speed.....802.11 b/g/n 300 Mbs
Wifi antenna efficiency.....> 60%
Wifi peak gain 3dbi
Modem chipset.....ASR 88MP1802
Category.....CAT4
SNMP.....supported
Type of Antenna.....Omni
Max throughput.....30-60 Mbps
Bridge Mode.....supported
Network Mode.....NAT-Routers-Bridge
ROM/RAM.....64/128MB
Static Route.....supported
IPV6 Dual Stack.....supported
SSH/telnet.....supported

This type of communication network which called 4G in non-military field; is wide network in whole the country. Considering using two individual frequency for upload and download, their quality is acceptable and generally this type of modems are used in small companies and homes. In addition, the modem can be used as a portable modem by adding battery and its charge circuit.
This modem can be manufactured in the frequency bands 3 and 7 with the cat4 and cat6 standards. At the present time, the cat4 model is manufactured.

# LTE TDD (Time Division Duplex) Modem

## Technical specifications

VPN Pass-through support.....(PPTP, L2TP & IPsec)
Support 4G.....TDD LTE B42/43
LTE speed.....CAT6 UL 220Mbs  DL 75Mbps
LTE antenna efficiency.....>70%
LTE peak gain.....4.5dbi
Wifi speed.....802.11 b/g/n/ac 300 Mbs
Wifi antenna efficiency.....> 60%-5GHz
Wifi antenna efficiency.....> 50%-2.4GHz
Wifi peak gain.....3dbi
Modem chipset.....GCT GDM7243QT
Router chipset.....MTK7621A
Category.....CAT6
SNMP.....supported
Type of Antenna.....Omni
Max WiFi throughput.....300 Mbps
Bridge Mode.....supported
Network Mode.....NAT-Routers-Bridge
ROM/RAM.....1GB
Static Route.....supported
IPV6 Dual Stack.....supported
SSH/telnet.....supported
FTP,HTTP,OTA,local upgrade and tr069.....supported

Another considered frequency band is the TDD which used one frequency for upload and download with specific timing. Benefitting from powerful chipsets in comparison with old generation of the LTE modems and individual chipset for the modem's router as well as high capacity RAM for increasing calculation process of the modem, TDD-LTE modems are reliable products for using by all the TDD-LTE internet users.

These products in a wide range supporting the cat4 and cat6 standards and ca or Mimo provide full antenna coverage in the country mobile operator networks.

Cellular Communication

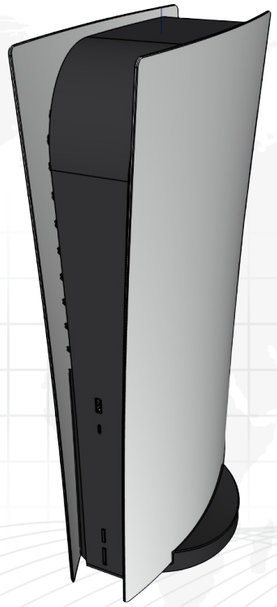
# LTE Dual Mode (TDD+FDD) Modem

Due to available limitations in the TDD-LTE services in different zones, a modem proportionate to these conditions should be designed. For this purpose, a dual modem with capability of supporting the TDD and FDD networks simultaneously has been designed and manufactured as an up to date products with many advantages in comparison with available modems in the market.

## Technical specifications

LTE Efficiency (Mimo).....70%
LTE Peak Gain.....4.5dBi
WiFi 2.4Ghz Efficiency and Peak Gain.....2.5dBi
antenna efficiency eff:50%, Gain
WiFi 5Ghz Efficiency and Peak Gain.....3dBi
eff:60%, Gain
LTE Chipset.....GCT GDM7243QT
WiFi Chipset.....MT7621E
TR069 and SNMP status.....supported
LTE Max throughput.....FDD: UL 75Mbps; DL 300Mbps
TDD(Config 2:7): UL 15Mbps; DL 220Mbps
Bridge Mode.....supported
Network mode.....(Nat/Route/Bridge) Support
GRE tunnels (layer 2 and 3).....supported
CPU and RAM size.....MTK: CPU 880MHz; RAM 1Gb
GCT: CPU 800MHz; RAM 1Gb
Static route.....supported
IPV6 dual stack.....supported
IPSEC tunnel.....supported
SSH/Telnet.....supported
VPN pass through.....supported
L2TP and GRE tunneling.....supported
FTP and HTTP OTA firmware upgrade.....supported
Local upgrade and TR069 upgrade.....supported
Tro69 upgrade can choose http or FTP

# Android Box Pro + Modem



Considering internet applications in homes increasingly, this box with capability of supporting the Tdd-Lte technology and attractive facilities including smart TV, smart home, and game console has been designed and manufactured.

✓ Easy control
✓ Joystick
✓ HDMI cable
✓ Adapter

Processor.....Dual 64-bit Cortex-A72 +Quad Cortex-A53 @1.8 GHz
Graphic.....ARM Mali-T860MP4 GPU,Support OpenGL ES1.1/2.0/3.0,OpenCL 1.2
RAM.....4GB LPDDR3
Internal Memory.....16 GB
Supporting the SSD Hard Disk.....Up to 2TB NVMe SSD M.2 Slot
USB2 port.....three
USB3 port.....one
Network.....four
Bluetooth.....available
Modem.....similar to the TF-i60





# Android Box Eco + Modem


Considering internet applications in homes increasingly, this box with capability of supporting the Tdd-Lte technology and attractive facilities including smart TV, smart home, and game console has been designed and manufactured.

✓ Easy control
✓ HDMI cable
✓ Adapter
✓ AV cable

Processor.....QUAD-2GHz
RAM.....2GB
Internal Memory.....16 GB
USB port.....four
Network.....one
Bluetooth.....supported
Modem.....similar to the TF-i60

# Android Box Eco


Considering internet applications in homes increasingly, this box with capability of supporting the Tdd-Lte technology and attractive facilities including smart TV, smart home, and game console has been designed and manufactured.

✓ Easy control
✓ HDMI cable
✓ Adapter
✓ AV cable

Processor.....QUAD-2GHz
RAM.....2GB
Internal Memory.....16 GB
USB port.....four
Network.....one
Bluetooth.....available

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