INTERCEPTION AND MONITORING SYSTEMS

PKI ELECTRONIC INTELLIGENCE GmbH GERMANY
PKI 1100 is a complex data monitoring system for the security and control of a country and its use is only allowed with the authorization by the security agencies.

For intelligence services, PKI 1100 is indispensable. Recorded data are analysed, processed and saved. For the monitoring of suspects, there is no better way to obtain information about their communication in compliance with the existing law.

PKI quotations can only be made directly with the relevant government agencies. Here, too, the prerequisite is to carry out a comprehensive consultation including an analysis of the requirements in advance.

PKI 1100 can be smoothly integrated into the network infrastructure of the telecommunications provider and controls the monitoring of suspects or services in accordance with the legal requirements.

The PKI 1100 system offers connected MCs to establish a controlled connection to the transition nodes of the network operator. The functionality ensures that the monitoring requests sent by the MC are transmitted to the correct transition nodes and in turn the monitored communications are forwarded to the corresponding MCs.

PKI 1100 can be connected to a wide variety of telecommunications networks, each system being able to support multiple security agencies at the same time. In the process, a strict separation between the security agencies is ensured. The system is a combination of hardware and software to control all types of monitoring activities from different network types.

The most important functions:
- Interfaces to PSTN, ISDN, GSM, 3G, LTE, VoIP, NGN and IP networks
- Support of several manufacturers for proprietary network elements (X1, X2, X3)
- Support of various telecommunications providers (H11, H12, H13)
- Support of different MCs
- Support of several security agencies
- Strict separation of security agencies
- Meets the ETSI telecommunications monitoring standards
- Control of system usage by central assignment of user rights and roles
- Report and logging function
- The automatic self-check keeps the status information of the connected interfaces up to date
- Voice and data router, which duplicates the monitored traffic from the network to the different MCs

Support of the most different telecommunications networks of multiple security agencies at the same time.

The most important advantages of the PKI 1100 System:
- Real time overview of all markers, connections to the network providers and security agencies
- Each security agency has access to the list of monitored network nodes, the type of supported markers and manufacturer-specific options
- Each security agency can view a list of its monitoring activities, the monitoring period and the list of network elements for which the activity is enabled.
- If more than one security agency simultaneously monitors a target, PKI 1100
ensures that each security agency receives a separate copy of the monitored communication content and of the metadata.

• If monitored communication content or the metadata cannot be forwarded immediately (if for example the connection between the PKI 1100 system and the security agency is temporarily not available), PKI 1100 stores the data in a buffer memory until it can be delivered; however, this is limited to a defined data volume or a certain period.

• All commands of PKI 1100 and their results are logged. The logs comprise and save both all actions listed automatically by the system and all user interactions. The logs are only accessible for the PKI 1100 system administrators.

• Network environments whose day profiles show high traffic load peaks can be covered by using the load distribution functionality (option).

• The capacity of the PKI 1100 system can be easily extended.

• As a result of the modular architecture, the PKI 1100 software can be distributed flexibly to the available hardware in order to achieve an optimum processing speed.

Technical standards:
• ETSI TS-133108 / 3GPP 33.108
• ETSI TS-102232-1
• ETSI TS-102232-3
• ETSI TS-102232-4
• ETSI TS-102232-5
• ETSI TS-102232-6

Supported H11/2 and X1/2/3 interfaces:
• Alcatel NTI
• Ericsson IMS
• Siemens/NSN
• Samsung
• SS8 XCPIO
• Nokia
• Ultimac LIMS/RAI
• Huawei NGN
• ZTE

Supported H13 interfaces:
• ISDN (DSS1)
• ISDN (E-DSS1)
• SS7 (ISUP)
• IP (UDP, TCP, RTP)

PKI Monitoring Centre
Recording, processing, analysis of monitored telecommunications

The PKI Monitoring Centre (MC) is a comprehensive platform to display, filter, save and analyse communication content from various telecommunications networks.

The PKI MC is a comprehensive system including both all necessary hardware and software. The success of the tried and tested solution is based on more than 30 years of experience and the close cooperation with numerous satisfied customers worldwide.

Security agencies and intelligence services use this system to monitor suspects to obtain information about their communication in compliance with the existing law.

The most important advantages and features of the PKI Monitoring Centre:
• Flexible, modular and scalable architecture for connection to different networks, such as PSTN / ISDN, GSM, 3G, LTE, Next-Generation, IP and VoIP networks
• A wide variety of powerful analysis tools enabling comprehensive searches, voice analyses, and site-based investigations
• Powerful decoders extracting content from the recorded Internet traffic, Web 2.0 applications and smartphone apps
• Ergonomically optimised user interface to facilitate evaluation
• Markers can be controlled centrally by a flexible system of rights and roles.
• The MC meets the legal and regulatory requirements through configurable workflows.

PKI Monitoring Centre
A turnkey solution preconfigured and tested for a smooth integration into existing network infrastructures.

Technical characteristics
• Supports ETSI, 3GPP, CALEA, SORM and a wide variety of national standards for handover interfaces for circuit-switched telephony and IP data
• Regularly tested compatibility with the most important network providers
• Scalable interfaces, processing bandwidth, memory and number of users
• Open platform supporting future decoders
• Indexing and processing engines automatically analyse large amounts of unstructured data
• Highest security standards offer protection against external intrusion and malicious content such as viruses

System architecture
The standard configuration of the MC comprises the following units:

• Handover interfaces
  • Connection to diverse standardized interfaces of network operators
  • Accept communication from different networks
  • Convert different input formats into a uniform format Processing and storage
  • Processes, controls and saves the monitored communication
  • Exports and imports data from/to other systems

Display and evaluation Graphical user interface to analyse monitored communication and to control the MC

Optional functions
Diverse analysis tools are available for the MC. Possible extensions are:

PKI 1100 Information System
The PKI Information System allows for the geographical monitoring of suspects in mobile phone networks and shows the location of the monitored persons and their movements on the map. This makes it easy to evaluate movement profiles and to recognize behavioural patterns of persons.

Search engine
The scalable search engine module offers a search function which has been developed especially for the current and future requirements of security agencies. It comprises all text information processed by the system.

Voice recognition
The voice recognition module can recognize individual speakers as well as spoken language, gender, age group, key words. Moreover, it offers the option to convert language into text.

PKI 1100 Interception Management System
The PKI Interception Management System enables security agencies to control complex network topologies from different manufacturers and network providers. It provides a central provisioning interface to enable or disable monitoring markers directly from the MC.
Interception and Monitoring Systems

GSM Monitoring

ACTIVE General Function

Mobile phone need contact to a base station to communicate. The active system simulates such a base station and thus enables absolute control of the mobile phones logged in there. The simulated base station allows to control unlimited numbers of mobile phones at the same time. The maximum possible configuration is 64 simultaneous monitored duplex conversations. The targets managed by the system are assigned to the channels on the fly. There is no fixed assignment of targets to dedicate active channels.

The system’s principle of operation is as follows:
When setting up the system the existing mobile networks are scanned and analysed. Based on this data the monitoring system blends in to the network infrastructure and represents the best possible cell for mobile phones close to the monitoring system. The mobile phones leave their cell and change to the monitoring system where the phones will be registered. In this moment the identity of the phones is gathered and the key for the encryption will be calculated. With this information a clone of target will be re-registered with the real network. From now on all communication data will pass through the monitoring system. The active system can handle all kind of used GSM encryption standards. A5.1, A5.2 by the integrated decipher unit and for networks using A5.3 by classmark manipulation. In our system, this is a fully automatic process which must not be configured arduously as in the past. The telephones now logged in via our base station are completely intercepted. IMSI (Temporary Mobile Subscriber Identity), IMEI and also the telephone type can be extracted by IMEI from the trapped phones using the integrated IMSI catcher. This can be realized for any existing network in the shortest possible time (in Germany e.g. T-Mobile, Vodafone, O2).

The telephones that are in 3G (UMTS) mode are downgraded to GSM mode using the 3G IMSI catcher and are thus intercepted too. The data captured this way then allow the take-over of selected target telephones. For this purpose, the system simulates the target mobile phone for the network by simply cloning (copying) it completely. The complete copy of the controlled mobile phone makes thorough monitoring possible.
When conversation or SMS, any communication is effected via the system. This so-called „Man in the middle” procedure allows manipulations in all directions. Answering calls, SMS or also holding conversations, listening to the voicemail, impedements are absolutely undetectable for the monitored mobile phone.
You have the overall control of a target/mobile phone and can for example increase its transmission power in order to prevent a loss of the target. Tracking a suspect during mobile use of the system is thus facilitated. Furthermore, it is possible to covertly switch the target phone to transmission mode so that it can be located in the direct surroundings using a direction finding system. The system can provide a GSM GPRS (EDGE) internet data connection to the target phones. As an option the system can be upgraded with an internet traffic analysing option which extracts information and identities from the data stream and integrates this into the so called monitoring database.

GSM Passive Monitoring

Monitoring systems that have no interaction with the telephones to be intercepted are called passive monitoring systems. The passive system is characterized by the fact that it only receives signals and does not transmit high-frequency signals itself. This is why a passive system cannot be recognized or located. Passive GSM monitoring systems receive the transmissions of the BTS and the telephone in two separate receivers. There is the so-called uplink from the mobile phone to the telephone network and the downlink from the BTS to the mobile phone.
The passive system can be adjusted to the surrounding BTS and automatically records the received conversations and short messages and stores them in the database. Ideally, the passive GSM monitoring system must be located in the vicinity of the mobile phone to be monitored in order to receive the transmissions of the telephone. The BTS at which the mobile phone is registered can usually be received. This may mean that only half of the conversation can be recorded. Clever positioning of the system and the use of appropriate antennas help to operate the system in a very successful way.

One of the challenges of operating a passive system is the recognition of mobile phones that were previously connected to the system. Mobile network operators use a temporary identifier (TMSI) instead of the unique IMSI which is transmitted in exceptional circumstances only. To meet this requirement, passive systems of PKI can be combined with active components in order to determine the telephone number of the mobile phone.
As with all PKI monitoring systems, the systems have a modular design and can be interlinked. The combination with active systems is also possible and there are components (e.g. decipher) that can be used for both types of systems. The user has flexible operating possibilities and can thus meet changing requirements.

Comparison of Active and Passive GSM Monitoring System

While the passive GSM monitoring system does only receive signals, the active system directly interferes with the network infrastructure. The active system acts like a BTS of the local GSM network. Intelligent manipulation of the transmission parameters makes this „false” BTS particularly attractive for mobile phones in the environment. The result is that the telephones try to log in on the system. This opens up numerous possibilities for manipulation. The telephone connected to the monitoring system can for example be located, be cut off of communication (intelligent jamming) or the communication can be forwarded to the telephone network and is monitored in the process. The telephone to be monitored is under full control of the monitoring system.

Also, in contrast to passive GSM monitoring systems, it is ensured in any case that the unique identity (IMSI/IMEI) of the mobile phone can be determined. Positioning the system between a mobile network and the telephone to be monitored (this is called man-in-the-middle attack) ensures that both directions of the communication can be recorded.

The control of the mobile phone also enables the device to be located by requesting the transmissions or by querying the GPS receiver present in many telephones. In passive systems, this can only be achieved to a limited extent by evaluating the so-called measurement reports.
In summary, it can be noted that passive systems have the advantage that operation cannot be detected. Active systems have extensive control of the mobile phones and enable the determination of unique parameters to identify and locate the telephone.
Cellular Monitoring Systems

PKI 1540
Passive GSM Monitoring System

The PKI 1540 is a passive GSM monitoring system. In their basic configuration passive systems do not have any active components, i.e. there is no RF radiation that might indicate the system. The PKI 1540 is available as dual band version for GSM 900 and 1800 MHz networks as well as as multi band version for 850/900/1800/1900 MHz. The system is capable of cracking the GSM A5.1 encryption in real time. On request, it is possible to additionally deliver a software decipher for the weaker A5.2 encryption. For the A5.1 encryption, a hardware decipher is used.

A separate receiver pair is used for each duplex channel for the uplink and downlink frequency. The basic configuration of the base unit comprises 8 duplex channels. This means that 8 parallel conversations can be recorded simultaneously. The user software is installed on the operator laptop. If more than 8 duplex channels are required, further receivers with 8 additional duplex channels each can extend the system. The decipher is sufficiently dimensioned to easily operate even large extension stages.

After switching on, the system automatically detects the surrounding GSM networks and offers the operator a useful selection of mobile radio cells in the area to simplify the configuration. Conversations and short messages are saved on the hard disk of the operator laptop and all information is automatically taken over into a database.

As passive systems generally only use the so-called TMSI (Temporary Mobile Subscriber Identification), it is usually difficult during later contacts to assign a target to previous events. For this purpose, the PKI 1540 can be upgraded to a so-called hybrid system.

In this configuration, a clone station is added to the setup. This way, the PKI 1540 is able to use the PN (mobile phone number) as a unique identifier. For this, a clone of the target phone is created for a short period, and a ping call is sent to a phone connected to the operator laptop. This way, the phone number (PN) can be used as an unmistakable identifier. The system is supplied with 24 V DC so that it can even be used portable or in cars. The receivers can be networked via the Internet so that it is possible to operate the system remotely.

Specifications:
• Wideband power supply: 9 - 36 V and/or 100 - 240 V
• Scope of supply includes laptop, receiver (dual or quad band), deciphering unit, antennas.
• Optional: Clone station for hybrid configuration, voice recognition software
• Operating range: up to 35 km
• Number of duplex channels in one receiver: 8
• Maximum number of monitoring channels: up to 16 units - 128 duplex channels
• RF sensitivity: -110 dBm
• Connection with laptop: LAN, Internet via VPN
• Casing: Aluminium
• Dimensions: depending on configuration
• Weight: depending on configuration
• Power: 90 - 264 V AC or 9 - 36 V DC
• Laptop: DC 20 V
Active Monitoring System

This system belonging to the PKI GSM Monitoring Program disposes of all the features that are possible in the area of active monitoring. Furthermore, it is the basis for any extensions offered by PKI for 3G and LTE. The PKI 1580 has a completely modular design and can thus be used in all networks, no matter what frequency or network technology. The system can be networked and controlled via VPN. In its basic configuration, the PKI 1580 consists of one or several GSM base stations, depending on the frequency usage at the location. For the connection to mobile networks a clone unit is used that registers in the GSM network instead of the mobile phone to be monitored. For operation (normally) in encrypted networks, the PKI 1580 is provided with an A5.1 decipher unit being able to cipher the required key in less than a second. In order to keep the number of necessary antennas low, the PKI 1580 can be equipped with antenna duplexer/combiners. The antennas required for operation of the GSM base stations can ideally be reduced to one antenna. The system offers a wide range of extension possibilities so that simultaneous operation in several networks is possible. The number of available conversations to be monitored in parallel is flexibly scalable. Additional base stations and clone channels also allow for later extensions. The PKI 1580 has numerous intelligent features that facilitate the user’s work. Among them are:

• Identification of the MSISDN phone number (PN detection). Although the GSM system does not transmit the phone number of a telephone via the radio link, the PKI 1580 can identify the number and record it in the database.
• Localisation. With the additionally available PKI 1680 Direction Finder mobile phones connected to the PKI 1580 can be located and found.
• Not only all contents of conversations and short messages are recorded, but it is also possible to perform extensive manipulations. SMS can be modified or stopped based on key words. Stopped messages e.g. can be forwarded only after a check by an operator. Calls can be blocked both ingoing and outgoing or can be forwarded to an operator. All actions can be activated based on phone numbers.
• The PKI 1580, unlike other GSM monitoring systems, is not limited to a small number of targets due to the number of clone channels. The system can simultaneously monitor any number of targets and assigns the clone channels dynamically from the database in the very moment when a mobile phone is in direct connection with the network. The number of conversations recorded simultaneously is only defined by the number of clone channels and the capacity of the base stations.
• Detailed representation of the telephones and surrounding base stations on a map enables the operator to visualize his targets.
• For mobile phones connected to the system, an internet connection via GPRS/EDGE can be made available. This data traffic is evaluated and can also be further analysed.
• The system can be operated stationary at 100V or 230V, but also as a mobile device at a 9V - 36V power supply.
• Optionally, a car installation kit is available.
• The PKI 1580 is available for the GSM frequencies 850, 900, 1800MHz and 1900MHz. Additional frequencies and capacities can be achieved by combining the hardware.

Work with the PKI 1580 is divided into the following steps:
• Commissioning of the system. Analysis of the mobile phone network at the location. On this basis, the system configures itself to the greatest possible extent. Search for random or known mobile phones. As soon as the telephones have contact to the system, the communication can be monitored. All the communication is processed and stored in the database of the system.
• Tools to evaluate the collected data are available.
• The entire control and database software is included on the delivered operator laptop. The collected data can be easily exported.
• GSM base stations have a max. output transmission power of approx. 15W.
• Space-saving design of dual band BTS incl. clone channels (one housing) is possible.
• Portable operation in a carrying case is possible.

Specifications:
• Output power: approx. 15W per band
• Frequency: GSM (incl. EGSM) 900MHz, DCS (1800MHz), PCS (1900MHz), GSM 850 (850MHz).
• can be supplied as dual band system with frequency combination 900/1800MHz and 850/1900MHz. Both frequencies can be used parallel.
• clone channels can be integrated in dual band device 900/1800 MHz. (One housing contains 2 BTS and up to 8 clone channels)
• up to 6 simultaneous conversations per BTS (GSM und DCS = 12 calls),
• can be upgraded with any number of additional BTS
• Antenna socket: SMA
• Connection to operator laptop: Ethernet/LAN
• A5.1 decipher unit can operate directly on system or remotely via VPN
• Power supply for 230V (90-230V) or (9-36V) for car usage
• antenna duplexer/combiner available: allows dualband transmission/reception only with one antenna. (Additional BTS 3G 2100 can be integrated).
• comes with modem for Public Number Detection on operator laptop
• including USB GPS receiver for operation with online maps
• power consumption up to 150W at full transmission power
Cellular Monitoring Systems

The **PKI 1600** is a passive monitoring system with 4 receivers offering the possibility to record up to two duplex connections in parallel. Since the **PKI 1600** only receives signals of the CDMA networks, the system cannot be recognized and does not cause any interference. In the beginning, surrounding base stations are monitored; as soon as a call from the base station is set up, one of the receivers is tuned to the uplink frequency of the telephone in order to record both call directions. The receivers will be dynamically assigned. If more than two parallel calls should be recorded, multiple devices can be operated at a laptop at the same time. All incoming data will be stored in a database on the operator laptop in a clearly arranged way and are available for further investigation. Due to its small size, the **PKI 1600** can be operated not only in vehicles, but also portably.

**Specifications:**
- CDMA (IS-95, IS-95A, IS-95B) and CDMA 2000 (CDMA 1x).
- Frequency range CDMA: 450, 800, 1900 MHz
- Operating range: In rural area: up to 1500 m - In urban area: up to 700 m
- Supported voice codecs: VRSC eVRC, QCeLP
- RF sensitivity: -110 dBm
- Duplexing scheme: fDD
- 4 receiver channels (2 duplex channels)
- Number of monitoring targets: Unlimited
- Operation modes: Random / target selection
- Connection to operator laptop: USB
- Dimensions: 330 x 268 x 80 mm
- Weight: 5.2 kg
- Power supply voltage: 24V
- Operator laptop: DC 20V

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The **PKI 1610** is an active catcher system to localise telephones working in compliance with the CDMA standard. The system imitates a CDMA BTS and thus makes the telephones in the vicinity register with the system and disclose their identity (MIN, ESN) this way. The collected data are stored in a database on the operator laptop and can be evaluated with respect to various criteria. Mobile or stationary operation of the system is possible. Depending on the mission requirements, the **PKI 1610** can be operated with directional or omnidirectional antennas. The output power can be set between 0.2 - 10 W and thus be adapted to the mission requirements. The **PKI 1610** is connected to the operator laptop via LAN and is therefore also suitable for operation via VPN networks.

**Specifications:**
- CDMA catcher (CDMA2000 1x)
- Frequency: 800 MHz (450 and 1900 MHz optional)
- Output transmitting power: 0.2 - 10 W
- Operating range: 500 to 1500 meters
- RF sensitivity: -35 to -126 dBm
- Power consumption: approx. 100W 24V / 20V for laptop
- Dimensions: 380 x 260 x 80 mm
- Weight: 5.2 kg
**IMSI Catcher**

The PKI 1620 IMSI Catcher is available for GSM networks with the following frequencies: 850/900/1800/1900 MHz. For the combinations 900/1800MHz and 850/1900MHz there are, additionally, dualband devices combining 2 frequencies in one. Our PKI 1620 IMSI Catcher is used with a laptop. The system is for portable use or can be applied in a car.

With the controller software many catchers can be operated at the same time and it is also used for the operation with PKI 1640 3G Catcher and PKI 1650 LTE Catcher. The PKI 1620 Catcher has got a scanning function that analyses the existing mobile networks at site and carries out the setup automatically.

The system collects the IMSI and IMEI of all telephones within reach and stores the information in a data base. Registered telephones are either immediately redirected to the mobile networks or can be kept on the system (selective jamming). Telephones connected with PKI 1620 can be called or reached by sms from the operator laptop. Furthermore, telephones can be located with our PKI 1620 system. The transmitter of the telephone is activated unnoticed and the unit can be located by means of a finder and a portable directional antenna (PKI1680). With modern smartphones, depending on the version, it is possible to read out the GPS position.

In addition, the telephones, the surrounding base stations and the own system can be clearly indicated on a map. In this case the location is performed by the Measurement Report of the telephone. PKI 1620 can be equipped with antenna combiners and duplexer to reduce the number of necessary antenna to one antenna only. (This is the ideal case, otherwise 2 antenna or 4 antenna for the dual band version).

PKI 1620 is suitable for upgrading and can also be applied for monitoring systems (security of investment).

PKI IMSI Catcher are completely network and VPN compatible and can thus be remote-controlled from distant places. For this purpose, only a network connection is necessary (local or internet).

**Upgrade possibilities:**

In combination with a clone channel and a decipher, PKI 1620 can not only identify the IMSI/IMEI but also the number of the registered telephones.

**Scope of delivery:**

- Single or dual band catcher. Operator laptop with software.
- Possible GSM frequencies: 850/900/1800/1900 MHz or dual band versions 900/1800MHz und 850/1900MHz
- Dual band versions are delivered in the same rack as single band versions (50% less space).
- Devices are operated with 24V. 100-240V adapter included in delivery.
- Antenna

**Possible accessories:**

- 9-36V adapter/car installation kit.
- Antenna Duplexer/Combiner to reduce the number of necessary antenna.
- Portable housing normal or protected, with battery and antenna.
- PKI1680 Finder with directional antenna normal or disguised.

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**3G/UMTS Catcher**

The PKI 1640 3G IMSI Catcher can be operated as independent catcher or together with other PKI catchers or monitoring systems. PKI 1640 is available for UMTS frequencies of 850/1900 switchable, 900/2100MHz switchable and 2100MHz also with 1700MHz uplink. When using the dual band version, you have to switch between the frequencies; operating both frequencies in parallel is not possible.

The unit is delivered with an external 3G scanner which analyses the networks at site. Based on this scan the necessary parameters for the respective operation are automatically calculated. Our PKI 1640 can be used in combination with the PKI 1580 monitoring system to downgrade the targets to 2G/GSM. Either global or by target. Furthermore, individual targets/telephones can be activated unnoticed and can then be located by means of the PKI 1680 Phone Finder. The included software has got several useful functions to evaluate the results.

- Single band 2100 or Dual band 900/2100 o. 850/1900 2(1700MHz Uplink). Dual band version switchable, only one frequency at a time, not in parallel.
- Monitoring Upgrade possible.
- Possibility to send SMS to all kind of telephones.
- Downgrade to GSM by target or global.
- Combinable with PKI 1620, PKI 1650 and PKI 1580 systems, operates under one user interface.
- 20W transmitting power
- 24V power supply
- Portable or for car installation.

**Possible accessories:**

- Antenna Duplexer and Combiner to reduce the number of necessary antennas.
- Car Installation Kit with 9-36V power supply.
- PKI 1680 Handheld Direction Finder mit directional antennas
PKI 1650

4G IMSI /IMEI CATCHER

The system is designed to collect basic identities (IMSI) of 4G/LTE mobile phones in the working area (airport, terminals, prisons, etc).

The basic unit of the system is a 4G/LTE module which provides communication with the corresponding types of mobile phones. It creates a fake BTS (Node B) with the best operation parameters for 4G/LTE communication. If a mobile phone tries to register with the Node B it presents IMSI, IMEI identities and some detailed information about its communication capabilities. When required information is collected by the 4G/LTE catcher, the mobile phone can either be released to provider’s 4G/LTE network or be downgraded to GSM operation mode. In the last case the mobile phone can be intercepted by our 2G/GSM monitoring system. It is also possible to make correlation analysis of IMSI/IMEI identities collected in different places and thereby reveal actual target’s identity.

The 4G/LTE catcher is fully compatible with the 2G/GSM and 3G/UMTS mobile active monitoring system. It can be used either as a stand-alone device or be integrated.

Features:
• semi-active type of the IMSI/IMEI collection algorithm
• scans and detects 4G/LTE networks in the working area
• detects 4G/LTE mobile phones and collects their identities (IMSI/IMEI and TMSI)
• displays phone model, country of origin and the network provider
• accuracy of distance measurements for 4G/LTE mobile phones is less than 30 meters
• selectively forces 4G/LTE mobile phones to 2G/GSM operation mode
• selectively blocks communication of 4G/LTE mobile phones
• detects the actual target’s identities using “target correlation” method

Technical data:
• frequency range: 4G/LTE : all bands
• emission output power:
  0.01 – 20 W – depending on configuration
• operation range:
  in rural area: up to 1500 m,
  in urban area: up to 700 m
• connection via LAN or WLAN: yes
• dimensions: 330 x 268x80 mm
• weight: 5.2 kg
• power supply: 90-264 V AC or 9-36 V DC, laptop DC 20V

PKI 1670

Catcher Detector

The GSM monitoring System (PKI1540) is the base for our PKI 1670. The device monitors the surrounding GSM networks in order to find GSM IMSI Catcher or other monitoring systems. Additionally, 3G/UMTS and 4G/LTE networks can be included in the monitoring. As soon as such systems have been discovered, the operating software is indicating it. Depending on the operating mode, the system can either monitor the Catcher itself or jam it. If the unit is in a monitoring mode, all communication processes and contents will be recorded. In case the monitoring system uses an encoding (A5.1), a respective decipher is required. In the other case the catcher is disturbed in such a way that it is no longer able to hold the connection in the system. This is not done by simple jamming but with selected interference in the communication with the telephones/targets. PKI 1670 can be completely remote controlled via internet/VPN and can thus be applied by an operation center not at site.

PKI 1670 catcher detector consists of:
• Operator Laptop
• Passive Monitoring Box (4-8 Channels)
• Hardware scanner for 3G/4G frequencies

Optional:
• Decipher to monitor the discovered system.
• Additional transmitting power amplifier to intensify the interfering signal.
• Directional antenna
• Detector to find the catcher
PKI 1680

GSM Direction Finder

The PKI 1680 Direction Finder can be used in combination with our IMSI Catcher or with the PKI 1580 Monitoring System.

If the IMSI Catcher detects a target, the telephone transmitter can be activated unnoticed. The PKI 1680 Direction Finder is then adjusted to the frequency currently used by the Catcher. While searching, the signal strength appears on the display and, additionally, as acoustic signal via earphone or Bluetooth headset.

An installed attenuator weakens the sensitivity of the reception. The PKI 1680 can be connected to an Android smartphone via Bluetooth visualising the signal strength and direction and also simplifying the operation. The use of a smartphone helps to secretly operate the finder which might be of importance for undercover investigation.

Specifications:
- Android App available as accessory.
- Covert and regular directional antenna.
- Power supply with built-in battery.
- Solid metal housing.
- Bluetooth ready for earphones and connection to smartphone.
- Supplied with charger.

- Frequencies:
  850, 900, 1800, 1900 MHz GSM
  850, 900, 1900, 2100 MHz UMTS
  800, 1800, 2600 MHz LTE

PKI 1800

IP Monitoring System for Analogue and Digital Telephone, e-mail, Fax

The technologies applied for communication have increasingly shifted into the IP sector. Whether e-mail, telephone, fax etc. today, all there means of communication demand digital bandwidth and are transmitted via IP-based networks. In contrast to the technologies applied so far, with IP technology no direct connection is established between the communication partners but communication is digitized, packed in small packets, possibly encrypted and subsequently more or less quickly and frequently exchanged.

In case of previous monitoring systems, a known sender automatically meant that the receiver was known, too. The conversation, fax, etc. was realized via a line to which both participants were connected. The data volume recorded this way is and remained manageable. The problem with today’s IP-based technology is that there is no direct connection any longer but only a communication distributed onto numerous packets. It is therefore necessary to separate the corresponding packets from the entire mass of data and to merge and decode them subsequently. Such a system shall in fact record the ongoing data traffic but it cannot participate – actively. What is difficult are e.g. lost packets which cannot be requested again or also packets transmitted several times in order to put together the original message. The solution to this is our PKI 1800 IP Monitoring System.

Integrated into the network to be monitored, any communication is stored and decoded to the greatest possible extent. And it is irrelevant whether a WLAN or a wired network is eavesdropped on here. The actual access to the network is realized with a repeater establishing the connection to the PKI 1800. The System logs all captured data into a database and thus enables a subsequent evaluation. Via the IP address, an assignment is then possible, via the data of the providers, to the user identity.

Additionally, our products include a huge range of accessories. In spite of their complex functionality, all devices come with an easily understandable instruction manual, which also describes their advantages and disadvantages and their possible field of application. Therefore, the ENDUSER have the possibility to combine all desired devices according to needs and wishes. Of course we can be of assistance, if you specify your personal requirements and we would be pleased to establish a personally designed and tailor-made configuration of devices.

Our PKI 1800 devices allow surveillance of telephone, e-mail and Fax without any restriction. All you need is a computer and some knowledge.
PKI 1800 records voice conversations from analogue and digital telephone lines, IP-telephony and other sources and gives instant and comfortable access to record data. PKI 1800 can be used for various application, e.g. by Police and other Law Enforcement Agencies, banking, insurance, emergency services etc.

PKI 1800 records from:
- analogue and digital phone lines
- IP telephony
- Microphones
- Line outputs
- Radio sets

The technical characteristics are:
- 300 channels in one recording station
- Audio format wav uncompressed or 16 x compression
- MS SQL Express database size up to 5 million recordings
- MS SQL standard database size up to 100 million recordings

The software modules includes:
- File Server, a back up database module
- Transcriber, a transcription module based on MS Word
- Fax Reader, a fax decoding module
- DB Stat Analyzer, a module for data statistical analysis
- SMDR Analyser, a module for call measurement recording via PBX interface
- Monitoring Board, a module providing a system status indication on LCD panel
- Event Log Monitor, a SMS and e-mail status messages.

The PKI 1800 Highlights are:
- High-quality recording
- Simultaneous recording and playback
- Real-time audio channel monitoring
- Fax Reader module decodes audio recordings of facsimile transmissions
- Sound module allows playback of speech with variable speed
- Embedded transcription module can be used to transcribe recorded conversations into text.
- Noise filtering module reduces the noise in recorded conversations making the speech clearer and more intelligible multi-channel recordings. Connection up to 8 channels into one file

Specifications:
- Input impedance: 3 Motion
- Rated voltage of input signal: -1,3V
- Signal-to-noise ratio: > 80 dB
- ADC resolution: 16 bit
- Active caller: ID
- Phantom power: 5V/12V
- Supports proprietary protocols: Alcatel-Lucent, Avaya, Lucent, AT&T, Bosch, Ericsson, Harris LG, NEC, Nortel, Panasonic, Samsung, Siemens, Tudiran, Telecom, Telrad, Connegy, etc.
- LAN connection: IP V.4, IEEE 802.3, Mirroring / Span port, Ethernet 100 Mb / 1 GB
- Supported protocols and speech codecs H.323, SIP and G.711. G.729a: IP-Telephony proprietary protocols. Alcatel, Avaya, Cisco, Ericsson, Nortel, Siemens

New generation VoIP interception and recording software
Along with recording analogue and digital telephone lines, microphones and radio channels, PKI offers VoIP recording technology. This turns PKI 1800 platform into truly convergent solution capable of recording each and every speech interaction necessary for your purpose.

PKI 1800 recording station captures and decodes VoIP traffic in a local area network via common Ethernet 10/100/1000 card. VoIP conversations are recorded in a database. All the relevant information as telephone and SIP-numbers, IP-addresses, date, time and duration is also stored in the database.

Basic technical characteristics:
- Operating with static and dynamic IP in networks
- Connecting to LAN IP V.4, Mirroring / Span port Ethernet 100Mb / 1 Gb
- Integration with CTI, TAPI, SAPI
- Codecs g711, g729a
- MS SQL Server 2005 Express, Database size up to 5 mio. recording
- MS SQL Server 2005 standard, Database size up to 100 mio. recordings
- Fileformat *.wav, G711 a/mu-Law stereo IMA HDPDM 4 bit mono GSM 6.10
- Archives format CD / DVD I R / RW *.xml

PKI 1800 Features:
- Recording modes: total recording operating button C Skip on Demand / Record on Demand
- Playback modes: real time monitoring playback on demand automatic sequential playback of clusters of recordings playback of recordings without typical preface of the conversation mixing the recording from different operators to compare their skills on typical calls facilities for comfort perception and speech intelligibility: digital AGC, playing in Loop, adaptive noise cancellation, tempo correction.
- Search, analysis and operating with calls: quick and enlarged search filters, calendar search, telephone number search, operators search, workgroups search making of quality control lists and questionnaires basing on MS Word patterns which are kept in databases and connected with recordings accompaniment of recordings life cycle with service digits and colored marks automatic archiving to CD / DVD
- System reliability control: logging at all system events and users activities. multilevel access restricted system email and SMS notification about all system events.

Opportunity to build a system with full hardware redundancy of recording stations and database replication.

Technical characteristics:
- Noise suppression depth: 0-24 dB for single-channel filtering
- 0-40 dB for reference channel stereo filtering
- Operation time (without battery change) – up to 14 hours
- Signal sampling rate: 11025 Hz
- Adjustable signal bandwidth: 200-5000 or 300-3400 Hz
- AGC adjustment range: 12 dB input
- 6 dB output
- Size: 110x45x113 mm
- Weight: 360 g

- Denoiser Box device with a carrying case
- Signal input/output cables
- External microphone
- Non-recoverable power supply 9 V
- AC 100-240 V 50/60 Hz power supply unit
- Cable for connecting Denoiser Box to digital voice recorder
- 12 V power cable / lighter plug

The architecture of PKI 1800 system is scalable. It is easily expandable with the servers with typical configurations which differ only in the size of their hard drives and main memory. It is possible to install all the software components for 100 channels to a server with 2,67 GHz Intel Core 2 Duo. For more than 100 channels it is recommended to include a dedicated database server and a recording station with a typical configuration to system hardware set while increasing a number of channels. The offered typical configuration allows using the system in distributed contact center with the number of up to 1000 channels.

The PKI 1800 Fax Reader decodes audio recordings of facsimile transmissions into digital images. The Highlights are the manual adjustment of fax transmission specific parameters as:
- Recorded file sampling frequency
- Fax transmission carrier frequency
- Fax transmission bit rate

The Features are:
- Automatic real-time fax decoding
- Group 3 (ITU T. 306 T. 4 rec.) fax decoding
- Decoding of the fax transmitted in accordance with ITU:
  V 21. - 300 bit/s
  V 27. - 2400 and 3600 bit/s
  V 29. - 2700 and 9600 bit/s
  V 17. - 7200, 9600, 12000 and 14400 bit/s.

MH and MR code decoding

For every order it is essential to know the exact requirement. This refers also to PKI 1800. Therefore we need following information in order to submit a specified quotation:
- number of phone lines to be monitored
- fax monitoring required, if so, how many lines or only a single one
- email monitoring required, if so, how many addresses or only one
Tactical Mobile Thuraya Monitoring System

The system can monitor the following Thuraya services:
• Voice, SMS, fax and data
• Interception of up to 4 spot-beams simultaneously
• Interception of up to 16 duplex calls simultaneously
• Decryption unit built in

PKI 1815 is designed to be easily transported to the places of operations. Quickly deployable and operational in a couple of minutes. The system is suitable for use in land, sea and air applications.

PKI 1815 is a rapidly deployable system for monitoring communications on the Thuraya satellite mobile communications systems. Call interception is passive, and thus not detectable by either the mobile user or the satellite network.

Control of the system is via an intuitive windows based GUI. Incoming calls are displayed in real-time, and voice is played via laptop unit. Software to decode and display a number of fax and data protocols is included.

Information relating to the identification of called and calling parties is recorder.

The system consists of the receiver, the control unit (laptop) and an antenna set.

Key features:
• Mobile satellite monitoring in radio line of sight
• Map functionality (own position, target position and beam position)
• Small, portable form factor
• Light weight
• L-band „target“ and „satellite“ inputs
• DC powered via AC adapter or vehicle adapter

Antennas:
PKI 1815 is supplied with antennas and cables for quick and easy deployment. One antenna is required to capture the satellite downlink, while the second (target) antenna captures the signal by the mobile terminal. Optional a range of antennas for a variety of deployment scenarios can be supplied by our company, including vehicle mounted and omni-directional antennas. The system also features variable attenuation to allow effective operation under a wide range of signal conditions typically experienced in the tactical environment.

Specifications:
Satellite Channel
• Connectors: TNC (SMA)
• Frequency range: 1525.0 to 1559.0 MHz
• Input signal level: The receiver subsystem will demodulate wanted signals from the satellite downlink subject to adequate signal level and carrier to noise ratios being available at the demodulator. Satellite channel signal levels may be displayed continuously on the control computer.

Target Channel
• Connector: TNC
• Frequency range: 1626.5 to 1660.0 MHz
• Input signal level: wanted signals from the MES uplink subject to adequate signal level and carrier to noise ratios being available at the demodulator.
• Target channel setting: Dynamic range 65 dB

Laptop unit
• Intel Core i5 Processor up to 2.53 GHz
• Windows 7
• 4 GB RAM
• 320 GB hard disk drive
• LCD 14" WXGA (1366 x 768) display
• 4 USB 2.0 compliant 4 pin connectors
• RJ45 Ethernet port, WLAN, Bluetooth
• Audio jack for headphones
• CD/DVD read/write drive
• MySQL server

Power requirements
• Receiver unit: DC powered 9-36V at 75W

Environmental
• Operating equipment: 5°C to +35°C, 10% to 90%
• Storage, all equipment: -20°C to +50°C, 5% to 95%

Dimensions and weight
• Receiver unit: 331 x 82 x 268 mm, 5.4 kg

Delivery scope
• Receiver unit: TMS-4SRX
• Control unit: laptop with software package
• Antenna set: 2 x omni-directional, 2 x directional patch antennas
• Power supply: car adapter 12V DC, PSU 230V AC/12V DC

Omnidirectional Antenna
The omni-directional antenna is a quadrifilar Helix antenna designed for use on the Thuraya satellite network, covering much of Europe, Africa, the Middle East and part of Asia (Thuraya Coverage Map).

Technical data:
• Frequency range: 1525-1560, 1625 - 1680 MHz
• Coverage: hemispherical
• Polarization: left-handed, circular (AR 3 dB)
• Gain: +2 dBic – Elevation pattern
• Nominal impedance: 50 ohm (RF)
• Input power: 1 Watt CW
• VSWR: 2.0 GRAPH
• Connector: SMA
• Dimensions: 4 cm x 11 cm
• Operating temperatures: -40°C to +85°C
• Weight: 250 g

Planar Antenna
The planar antenna is a flat panel antenna with low noise amplifier for receiving downlink signals from the Thuraya satellite network, covering much of Europe, Africa, the Middle East and part of Asia (Thuraya Coverage Map).

Technical data:
• Frequency: 1.525 - 1.590 GHz
• Pattern: directional
• Polarization: LHCP
• Atenna gain: 15 dBic
• Output impedance: 50 ohms
• Power supply LNA: 12V, 65mA (supplied from TMS-4S)
• Gain LNA: min 20 dB
• Connector: SMA
• Operating temperature: -55°C to + 85°C
• Dimensions: 50 x 25 x 3 cm
• Weight: 950 g

If you are interested in a strategic Thuraya monitoring solution, please inform us briefly so that PKI can submit an adequate quotation.
PKI 1820

**Iriddium Interception System**

**PKI 1820** is a real time interception system providing a comprehensive monitoring solution for Iridium satellite communication. The Iridium communication system is a large group of satellites providing voice and data coverage for satellite phones, pager, and integrated transceivers. With more than 500,000 total subscribers, Iridium is the only mobile-voice and data satellite communications network that spans the entire surface of the earth, serving both commercial and government subscribers. Monitoring and intercepting Iridium is an essential task for government agencies in the continuous effort to ensure effective intelligence gathering from this steadily growing network. **PKI 1820** captures the link between satellites and mobile units, providing comprehensive L-band results. Voice calls produced by the system contain synchronous and uninterrupted voice playback using state-of-the-art signal processing methods and algorithms. **PKI 1820** produces and displays voice calls and data shared on target networks in real-time, as they are intercepted. Voice and text communication interceptions are stored in a managed database for on-demand audio replay and social network analysis. All data can be conveniently exported to any standard format for post-mission data research and analysis. The system is operated by a powerful, flexible and user-friendly management console. **PKI 1820** is especially designed for government organizations, law enforcement units, and intelligence agencies demanding high standards real-time information gathering, storage and data extraction. **PKI 1820** enables predefined lists of intercept targets, specifying names, phone numbers, and network-specific parameters. **PKI 1820** supports both remote and local operations, as well as multiple operators. By efficiently dividing the work between several operators in real-time, intelligence gathering capacity can be significantly increased. **PKI 1820** is modular and can be installed in various form factors, from a standard 19” rack-mount version to a rugged transportable edition. **PKI 1820** is used by Intelligence and Homeland Security agencies

- Law enforcement and investigations units
- Armed forces

**Specification:**

- Receivers technology: wide band receivers
- Interception method: 100% passive, off-the-air
- Frequency coverage: L-band
- Data monitored in real time: voice calls, SMS ("Paging"), data
- Capacity: up to 50 concurrent calls
- Number of operators: 1-3 simultaneous operators

**Features:**

- Real time interception of Iridium voice calls, SMS and data
- Location finding of Iridium handsets and terminals
- Comprehensive interception
- Extended geographic coverage
- Automatic link analysis, social networking and intelligence-driven alters

PKI 1830

**Door Intercom Recorder**

The door intercom recorder is a compact recording device that can be connected to state-of-the-art bus based door intercom systems. All events such as doorbell ringing or door opening are logged and calls via the intercom system are recorded. Depending on the investigation and data privacy protection requirements, this can be carried out globally or individually for certain door intercom locations.

Later, the events can be queried or directly forwarded to a monitoring centre via a network/mobile phone connection depending on the design/configuration of the recorder. **PKI 1830** power supply is directly provided by the intercom system. It is compatible with most system protocols available on the market. The recorder can usually be connected to any point of the wiring of the intercom system.

PKI 1850

**PC-supported Telephone Monitoring System**

The surveillance of any kind of telecommunication, of course, is our main field of business. Whether analogue, digital or cellular, you will find the corresponding monitoring device in our scope of supply and in this catalogue. The **PKI 1850** has been developed for the monitoring of digital and ISDN telephone lines. But the main advantage is that it can be used for stationary and mobile use. Without any problem each necessary data, like telephone number, date, time and other criteria can be stored on a laptop. Each call will be stored as a WAV-file. By means of the supplied software, the WAV-file can easily be administrated and can be opened to hear the content of each call plus indicating the relevant data. Each WAV-file can be stored in compressed or uncompressed version for further action.

**Specifications:**

- Dimensions of unit without laptop approx. 76 x 55 x 19 mm
- Weight of unit without laptop approx. 50 g
- SO-interface ITU-Standard I.430
- Connection 2 x RJ45 Western Modular
- Tests Polarity, Framing, Power, Protocol
- Channels 2 x (D, B1, B2), E, M, A, Q, S
- USB 1.1 and 2.0 (full speed)
- USB socket USB Type B
- Power < 90 mA
- LEDs 4 x red/green
- Storage: 16 KB per second/call, uncompessed WAV file
- Sampling frequency 8000 Hz
- WAV format A-Law Stereo, Mono, MP3, GSM

Windows XP, Windows Vista

- Software disk space max. 140 MB
- Processor 500 MHz (min for single device operation)
- Connection to telephone system Point-to-Point or Point-to-Multipoint
- Device package includes

**PKI 1850** device, Software-CD, USB and ISDN cables, instruction manual
**PKI 1855**

**Hard Disc Converter**

With **PKI 1855** it is easy to copy datas from built-in hard discs. Just connect the hard disc to the USB port of your PC by means of the **PKI 1855**. Compatible with all standard 1.8", 2.5" and 3.5" IDE hard discs. By means of this copying converter you can easily obtain all important information. Furthermore this converter is also suitable for testing and connection of all types of hard discs and burner via USB 2.0 port.

**Specifications:**
- Hard discs: SATA (L-type) and IDE, copying possible
- Sizes: 1.8", 2.5" or 3.5"
- Comes with: converter, adapter, power plug, SATA-cable
- Various: no installation inside PC necessary

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**PKI 1860**

**Telephone Tapping Device**

The **PKI 1860** can easily and quickly be installed on telephone lines, subject to entering the room at least once or for a short time. It allows continuous tapping of a telephone line without leaving outer traces. Just clip the contact clamp onto the telephone cable and listen to the conversation of both sides via the included headphones, or alternatively save it with a recording device.

**Specifications:**
- The only way to tap telephone lines without having to cut them.
- Impossible to be detected or located via TDR reflectometer.
- Easy and quick installation – just fix the clamp onto the cable and turn it on.
- Equipped with connection sockets for headphones and recording device (D 1300)
- Dimensions: approx. 34 x 20 x 114 mm

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**PKI 1865**

**Digital Telephone Conversation Recorder**

Small but powerful – a technological miracle. With this recorder all telephone conversations can be controlled. It works on both, analogue and digital telephone systems. Very simple installation between receiver and telephone set by means of the included connection assembly. Due to the integrated voice-control all telephone conversations will be recorded automatically and can be monitored either via the integrated speaker or earphones (included). Also included is a connection cable for playback via PC.

**Specifications:**
- Power supply: 2 x 1.5 V batteries type AAA
- Operating temperature: 0 - 40°C
- Frequency range: 500 Hz-3500 Hz
- Max. output: 200 mW / 8 ohm
- Operation time: more than 12 hours
- Display: LCD
- USB interface: USB 2.0 standard
- Weight: approx. 34 g w/o batteries
- Dimensions: 115 x 33 x 15 mm
- Supported data formats:
  1) MP3 (MPEG 1,2 and 2.5 with audio layer 3)
  2) WMA (Windows-Media-Audio)
- Data stream:
  1) MPE (8 to 320 kbps) on playback
  2) WMA (32 to 192 kbps)
- Recordings: Telephone, integrated and external microphone, line-in
- Max. number of recorded segments: 2 x 200 segments / files
- Name of directories and data type:
  (directory/recording quality/data type)
  IP *1 / „ACT” data type
  SP *1 / „WAV” data type
  MP *1 / „MP3” data type
- Average recording capacity:
  1 GB Memory – depending on recording quality and type:
  (HP) *1 10 h
  (SP) *1 70 h
  (IP) *1 282 h

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**PKI 1960**

**Separate GSM Network**

Such a private mobile communications network can e.g. be used on ships, during disasters or on the occasion of events, etc. A connection to the conventional telephone network via VOIP or ISDN is also possible. It offers an operating range of up to 30 km when using an antenna on a radio mast. The **PKI 1960** is available in different security level designs. The customary GSM devices can be used as mobile phones.

**Specifications:**
- Power supply: 110/220VAC
- Operating range: 30 km
- Max. number of mobile phones used: 600
- Power output: 20 W
- Miscellaneous: Voice service, SMS service, data service max. 150 kbit/s
- On request, the **PKI 1960** can also be delivered as CDMA network.
Interception and Monitoring Systems

GPS / GSM Technology

Audio Surveillance Equipment

Counter Surveillance

Video and Night Vision Systems

Jamming Systems

Police, Customs and Military Equipment