

## **Wireless Access System**

### **IAS-W**



### **General Description**

## General

The IAS-W is a digital wireless access system with a **Point-to-Multipoint (P-MP)** architecture which is engineered to provide a state of the art means of building telecommunication access networks.

IAS-W is part of INTRACOM Access System (IAS), which is an integrated access platform for providing telecommunication services in **urban, suburban** and **rural** areas either through cables (fiber and copper) or through radio links.

The increasing importance of wireless access technologies is driven by a number of operators' needs, for which wireless-based systems exhibit certain advantages over the wire-line based counterparts, such as:

- Low initial investments and scaleable deployment of network resources in order to follow the service provisioning demands
- **Short roll-out time** to satisfy the usually tight deployment schedules
- **Increased flexibility** to adjust to the network plans in the optimum way

IAS-W addresses these needs in a very competent and cost-conscious manner employing a number of features summarized as follows:

- **TDM/TDMA** Frequency Division Duplex wireless access operating modes along with advanced modulation techniques, securing optimum spectrum use
- **60x64kbps** or **120x32kbps** traffic channels per sector on a demand assignment basis, i.e. traffic carrying capability in excess of 103 Erlangs
- **Comprehensive range of wireless remote network units** (terminal, repeater or mixed types), to satisfy various subscriber topology and density needs
- Use of **1.5 GHz** microwave frequency band to server both long-haul and short-haul access applications
- Extensive **NMS** capabilities
- **Low power consumption** by implementing burst transmission modes in both upstream and downstream directions

For service provisioning, the IAS-W provides both **POTS** and 4-wire **analog leased lines**.

An IAS-W system physically consists of a **Wireless Central Node (WCN)** and multiple **Remote Network Nodes**.

Two types of Remote Network Nodes are available: the **Repeater Node (RN)** and the **Terminal Node (TN)**. Both units can provide subscriber service, although the RN is mainly used to extend the IAS-W coverage distances.

## Applications - Services

Modern access networks are configured mainly in branched or star topologies, however specific applications require linear configurations as well.

IAS-W, due to its point-to-multipoint structure, is effectively configuration insensitive and provides the operator with a solution to satisfy almost any topology. Furthermore, IAS-W offers an effective solution regardless of terrain morphology and environmental conditions.

The system can provide telecommunication services in the following applications:

- In **rural areas** where telecommunication services are to be provided to remote dispersed groups of subscribers. Rural areas include villages, farms, remote industrial or holiday resorts and military sites. Point-to-multipoint radio systems are the optimum solution for such areas which are characterized by large distances from the Local Exchange, low subscriber density and grouping, harsh terrain and environmental conditions, as well as lack of telecom and utilities infrastructure
- In **remote areas** where industries or commercial enterprises such as remote construction sites, mines, oil fields, hotels and resorts are scattered requiring high-quality telecommunication services
- **Emergency recovery cases** following natural disasters, where IAS-W can provide a fast and easy-to-implement network
- In **urban and suburban areas**, where due to a rapid expansion, the fast deployment of telecommunication servicing is required, but the existing cable infrastructure is either not sufficient or not available. IAS-W can satisfy both this time and capacity requirement.

IAS-W supports wire-line equivalent Telephony services including G3 fax and payphone on a circuit switch basis. Data services over POTS lines supported by in-band modems with data-rates up to 32 kbps (V.34) provide a reliable connection to Internet.

Custom Calling services supported by the Exchange are typically transparently available at the subscriber side.

## System Description

Each IAS-W system consists of the following primary elements:

- Wireless Central Node (WCN)
- Up to 120 Remote Network Nodes, Repeater (RN) and/or Terminal (TN)

### Wireless Central Node (WCN)

The **WCN** is the single connection point between an IAS-W system and the Public or Private Switching Telecommunications Network. Each WCN provides the interfaces between the system and the Local Exchange and processes all of the main required control and traffic handling functions. The WCN also provides the interface for the IAS-W Network Management System.

The WCN is a rack-mounted indoor unit, located next to the Local Exchange and can be configured in different ways depending on the interface types it accommodates. With an analog interface to the Local Exchange, the WCN equipment includes mainly two modular subsystems, the **MCS** (Main Control Subsystem) and the **EXss** (Exchange Interface Subsystem) plus the **PDF** (Power Distribution Frame) and **MDF** (Main Distribution Frame)

The MCS includes a number of units responsible for system operation - **MPU** (Main Processor Unit), **NMU** (Network Management Unit), and **TPU** (Traffic Processing Unit), **RU** (Radio Unit) and the **PSR** (Power Supply Radio).

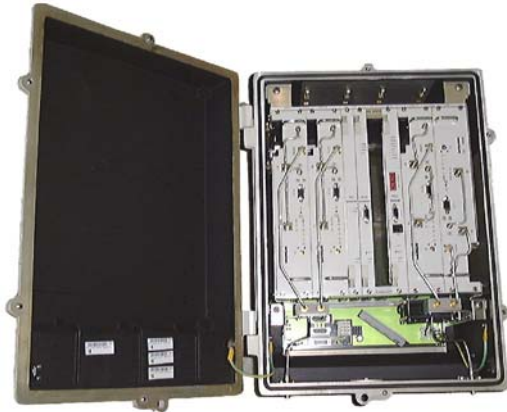
The ExSS sub-rack includes a number of units responsible for the analog system interface: - the **ECU** (Exchange Concentrator Unit), **EXIC** (Exchange Interface Card), and **PSV** (Power Supply Voice).



**Wireless Central Node (WCN)**

### Repeater Node (RN)

The Repeater Node (RN) is used to enhance system coverage, in the cases where no line-of-sight exists or very long-hop distances are required. RN operates as traffic-through or drop.



### Repeater Node (RN)

The RN can also supply 30 lines of POTS service. An Extension Cabinet can be added to each site to accommodate additional lines thus increasing the number of subscribers that can be served from the same RN location.

Each Repeater Node also uses a separate cabinet, which contains the local power units and subscriber line terminal strips. This cabinet is called the Power Supply Unit (PSU). It can be fed with 110 Vac / 60 Hz or 36 to 72 Vdc and is equipped with batteries that maintain the station in operation in case of ac power failure, for at least 8 hours



### Power Supply Unit (PSU)

If the Repeater Node includes an extension cabinet, a PSU and a Terminal Box are required to serve both main and extension cabinets, offering at least eight hours autonomy. The Terminal Box contains a battery set and the subscriber line terminal strips, and serves the RN Extension Cabinet.

### Terminal Node

The Terminal Node (TN) is a remote network unit housed in a cabinet suitable for outdoor or indoor installation. It communicates with the WCN or an RN and serves as the termination point for up to 120 wired subscribers. An extension cabinet can be added to each site to accommodate an additional 120 lines to increase the number of subscribers served at the same TN location.



### Terminal Node (TN)

Each Terminal Node is accompanied by a separate cabinet, which contains the batteries and the subscriber line terminal strips. This cabinet is called Terminal Box and its batteries maintain the station in operation in case of ac power failure, for at least 8 hours.

If the Terminal Node includes an extension cabinet, two Terminal Boxes are required to serve both the cabinets, main and extension one, offering at least eight hours service.

## System Operational Features

The IAS-W is equipped with a variety of features that enhance its operability and increase its reliability.

- Start up configuration
- Ranging
- Fault Detection & Recovery
- Fault Tolerance / Redundancy
- System management functions
- Intra-call
- Performance Testing
- Local O&M in WCN
- POTS service enhancement
- Subscriber access priorities

## Network Management

Management services are offered locally through a general purpose personal computer or remotely through a more sophisticated workstation-based Network Management system.

### Interface to Local Terminal (LT)

IAS-W can be controlled and monitored via a Local Terminal (LT), i.e. a general purpose personal computer (PC) running the LT software. The PC can be connected through its serial port to the WCN.

The LT application running on the PC provides the local operator with full access to the whole system. LT is a Windows 2000 / XP application, utilizing a graphical user interface for easy access to the system functionality.

The LT application supports the following functions:

- Alarm monitoring
- System configuration
- Configuration management
- Trace & status
- Security management
- Test management

### Network Management System (NMS)

The Network Management System of the IAS-W is built on an in-house developed, CORBA based platform. The purpose of the **Access Radio Management System (ARMS)** is to provide operators with centralized, coherent views and management facilities of network resources, regardless of the specific IAS configuration. From a single location, operators are able to remotely monitor and actively control the operation of many IAS locations. The collection of status information concerning the whole network allows the ARMS to further act as a first level decision support tool allowing operators to define the behavior of the network as a single entity.

The ARMS augments the control capabilities provided by the local terminal. However, it additionally provides integrated centralized access on a network wide scale instead of on a per element basis.

With the ARMS taking advantage of the flexibility, robustness and fault tolerance of the IAS architecture, the end result is a managed system that is inherently fault tolerant, with self healing capabilities and an operator definable behavior in the face of adverse operating conditions.

In summary, the functional areas supported by the ARMS are the following:

- Fault Management
- Configuration Management
- Performance Management
- Security Management

For additional information about ARMS, please refer to the ARMS Technical Description.

## Technical Specifications

### System Data

**Transmission Bit Rate (aggregate):** 5 Mbps

**Transmission Bit Rate (net):** 4.096 Mbps

**Synchronization, Signaling, Maintenance:**  
8 x 32 kbps

**Data Channels:** 120 x 32 kbps or 60 x 64 kbps

**Access Method:** TDM/TDMA

**Maximum number of Remote Network Units:** 120

**Maximum number of POTS subscribers per Remote Network Unit:**

**TN :** 180

**RN:** 120

### Microwave Transceiver

**Frequency band (GHz):** 1.5

**Transmitter Power:** 17 to 29 dBm

**Channel Spacing:** 3.5 MHz

**Modulation:** DOQPSK

**Spurious Emission:** < -50 dBm

**Receiver Threshold (BER<10-3):** -90 dBm

**Receiver Dynamic Range (BER<10-3):** 60 dB

### Services

**2 Wire POTS**

**Analog trunk 4 Wire**

### Power Supply Requirements

**WCN:** -36 Vdc to -72 Vdc

**TN:** 110 Vac or -36 Vdc to -72 Vdc

**RN:** 110 Vac or -36 Vdc to -72 Vdc

### Mechanical Dimensions

*(H x W x D in mm)*

**WCN Rack:** 2220 x 600 x 300

**TN, RN:** 518 x 366 x 322

**Terminal Box:** 400 x 410 x 246

### Environmental Conditions

#### Operating Temperature

**WCN:** -5°C to +50°C

**TN, RN:** -35°C to +55°C

**Humidity:** up to 95% RH (non-condensing)