

PRODUCT SPECIFICATION
(DOC. NO:A9.20.0001.PS.EXT)
AND
PICO BTS INSTALLATION AND COMMISSION PROCEDURE
(DOC. NO.:A9.10.0004.CMMI)

Aval Communications Inc. IS-136 Picocell BTS

Product Specification (A9.20.0001.PS.EXT)

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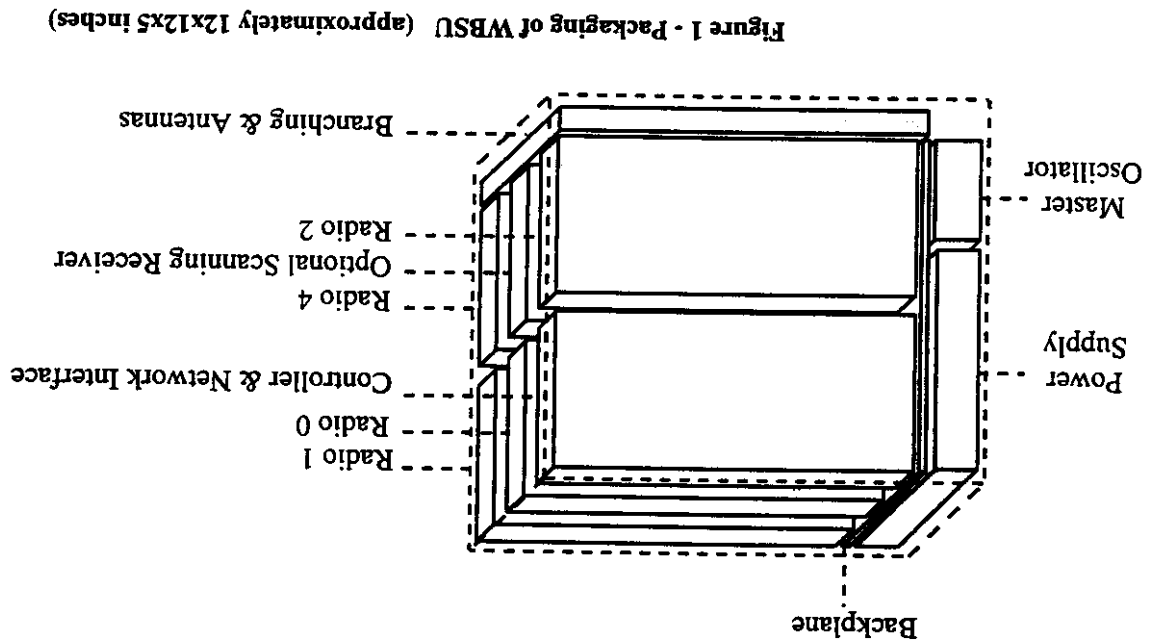


Figure 1 - Packaging of WBSU (approximately 12x12x5 inches)

The Radio and Vocoder functions reside on the Radio Card. The Scanning Receiver functions reside on a separate card. The BTS Controller and Network Interface functions are provided in the controller card. The radio cards and the controller card are connected using the backplane. The Power supply and Master Oscillator reside on a single board next to the backplane, and the RF Branching and combining functions are located on the branching board. The top level functional description of each of these functions is included in this document.

- Power supply
- RF Branching
- to provide regulated DC voltages to the other BTS modules
- to combine the RF output of the radios and connect them to antennas

2. Reference

- [1] TTA/EIA/IS-136.1, TDMA Cellular - Radio Interface - Mobile Station - Base Station
Compatibility - Digital Control Channel
- TTA/EIA/IS-136.2, TDMA Cellular - Radio Interface - Mobile Station - Base Station
Compatibility - Traffic Channel and FSK Control Channel
- [2] EIA/TTA/IS-138, TDMA Cellular - Radio Interface - Minimum Performance Standards for
Base Station
- [3] IS-130, TDMA Wireless System - Radio Interface - Radio Link Protocol 1

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4. Picocell System Overview

The picocell system block diagram is shown in Figure-3. It shows the connections between the Picocell BTS and the rest of a typical wireless office system. The T1 connection provides the line interface between the Picocell BTS and the Wireless Office Service Controller (WOSC). The T1 connection can be daisy-chained to serve multiple Picocell BTSs from one T1 port on the WOSC. Each time slot on the T1 interface transports a single DTC. The connectivity between T1 time slots and radios is dynamic, in that any T1 time slot in the pool of traffic time slots can be assigned to any call. The first T1 time slot is reserved for broadcast messages to all BTSs.

The Picocell BTS also supports compressed voice so that 6 DTCs can be supported on a single T1 time slot. This capability allows many Picocell BTSs to be daisy-chained on a single T1 from the WOSC.

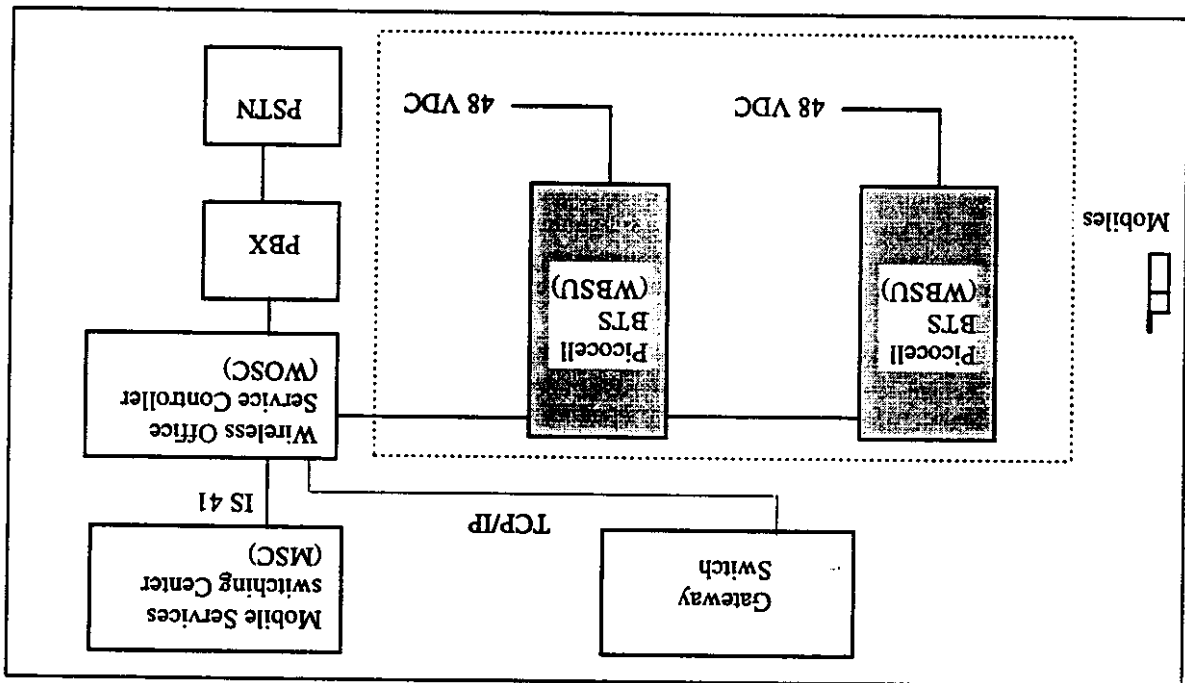


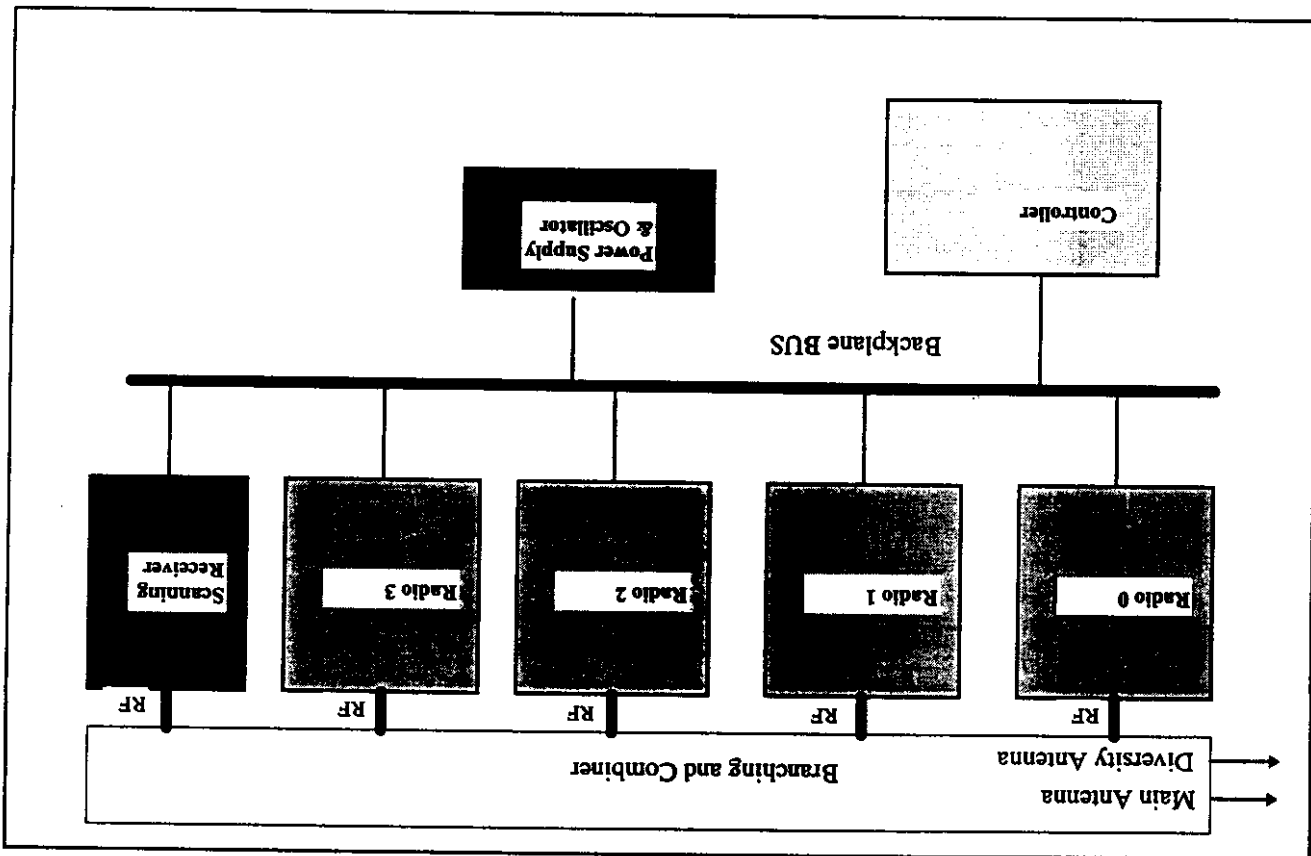
Figure-2 Wireless Office System (WOS)

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Figure-4. WBSU Functional Block Diagram



The WBSU functional block diagram is shown in Figure-4. Within the PicoCell BTS, the BTS controller communicates with other modules using the back-plane bus.

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The controller board is responsible for supplying clocks for the entire system. This includes clocks internal to the controller board, and clocks required by the radios.

5.2.1.1 Clock Generation and Control

A failed card, permanently.
card. When used as outputs they can be used to drive a card into reset, either momentarily, or in the case of configured as both inputs, or outputs. When used as inputs they can be used to detect the presence of a radio plane control lines. These lines are connected directly to the RISC processor, so these lines can be The controller card can reset the radio cards, and detect their presence via five dual function back-control channel (DCCCH), has an additional DSO devoted entirely to DCCCH processing.
control purposes (i.e., configuring the radio, reporting radio status), but the radio that carries the digital communicates indirectly via the message DSP. Most of the radios have a single DSO connection for general over the back-plane bus. Since the RISC processor has no means of directly accessing the back-plane bus, it All the radio control and status information between the RISC processor, and the radios is carried

5.2.1.1 Radio Control

transceiver, via the back-plane bus.
Voice channels intended for down-stream WBSU are routed by the switch from transceiver to radios via the back-plane bus.
which connects to the radios. In the case of 64kpbs PCM voice, the switch routes the voice directly to the the T1, and 3 voice per ST slot on the back-plane bus link to the radios), and routed on the back-plane bus case of compressed voice, where they are repackaged between two different formats (6 voice per DSO on link. The DSO channels that contain voice information are routed by the switch to the message DSP in the Voice connection from the WBSU is provided by the same T1 link as used for the HDLC control

5.2.1.1 Voice Connection

optional RS232 connection for a PPP port, which is also available through a front panel RJ45 connector.
and accessible through an RJ45 connector on the front panel of the controller card. In addition there is an Maintenance support is provided by a local RS232 port connected directly to the RISC processor, chain are routed by the switch onto the back-plane bus, which connects from the switch to T1 transceiver 1. processor through the shared memory interface. HDLC channels that are intended for the next WBSU in the and routes them to the message DSP where they are encoded and decoded, and made available to the RISC transceiver to the switch. The switch extracts the HDLC channels that are intended for the current WBSU T1 span is extracted by the T1 transceiver 0, converted to the back-plane bus format, and output from the WBSU. These DSO channels are carried by the T1 link from the WOSC to the WBSU, where the complete DSO channels per WBSU, this allows for a communications bandwidth of between 64 and 192kpbs per The control link from the WOSC to the WBSU units, consist of between one and three full duplex chain (HDLC over T1).
purposes (RS232 PPP port), and finally one control link between the WBSU, and the next WBSU in the local serial link for maintenance purposes (RS232 maintenance port), one optional serial port for test There is one external control link between the WBSU and the WOSC (HDLC over the T1), one

5.2.1.1 Control Links External to WBSU

- A clock generation unit to provide all the system clocks for the WBSU operation.
- WOSC, and a second T1/E1 transceiver to provide a daisy chain connection to the next WBSU.
- Two T1/E1 transceivers. One to provide voice/control connectivity between the WBSU and the
- Three optional bi-color LEDs, which are used to indicate the current state of the controller card.
- DRAM to be used as program and data memory.
- Flash ROM for file storage.
- Boot ROM to store the boot load code for booting up the controller.

- Configuration of radios
- DCH messages encode and decode (layer 1 and layer 2 only)
- DTC messages encode and decode (layer 1 and layer 2 only)
- Abis protocol handling
- OAM&P messages encode and decode
- Message interface with Modem/Vocoder DSP
- BOOTP and TFTP for software download
- Initialization of the controller hardware and drivers
- Power-On Self Test (POST).
- Trace and other built-in diagnostic software.

The BTS controller software provides the following functions.

The controller software is downloaded from the WOSC when the power is turned on for the first time. The software can be loaded from the FLASH file system.

5.1.1 WBSU Controller Software

Pin	Function
1	NC
2	NC
3	NC
4	NC
5	Signal Ground
6	Transmit Data
7	Receive Data
8	RTS
9	CTS
10	NC

Optional RS232 PPP port: RJ45 connector

Pin	Function
1	NC
2	Signal Ground
3	20ms Test Pulse
4	Signal Ground
5	Signal Ground
6	Transmit Data
7	Receive Data
8	RTS
9	CTS
10	NC

RS232 Maintenance port: RJ45 connector

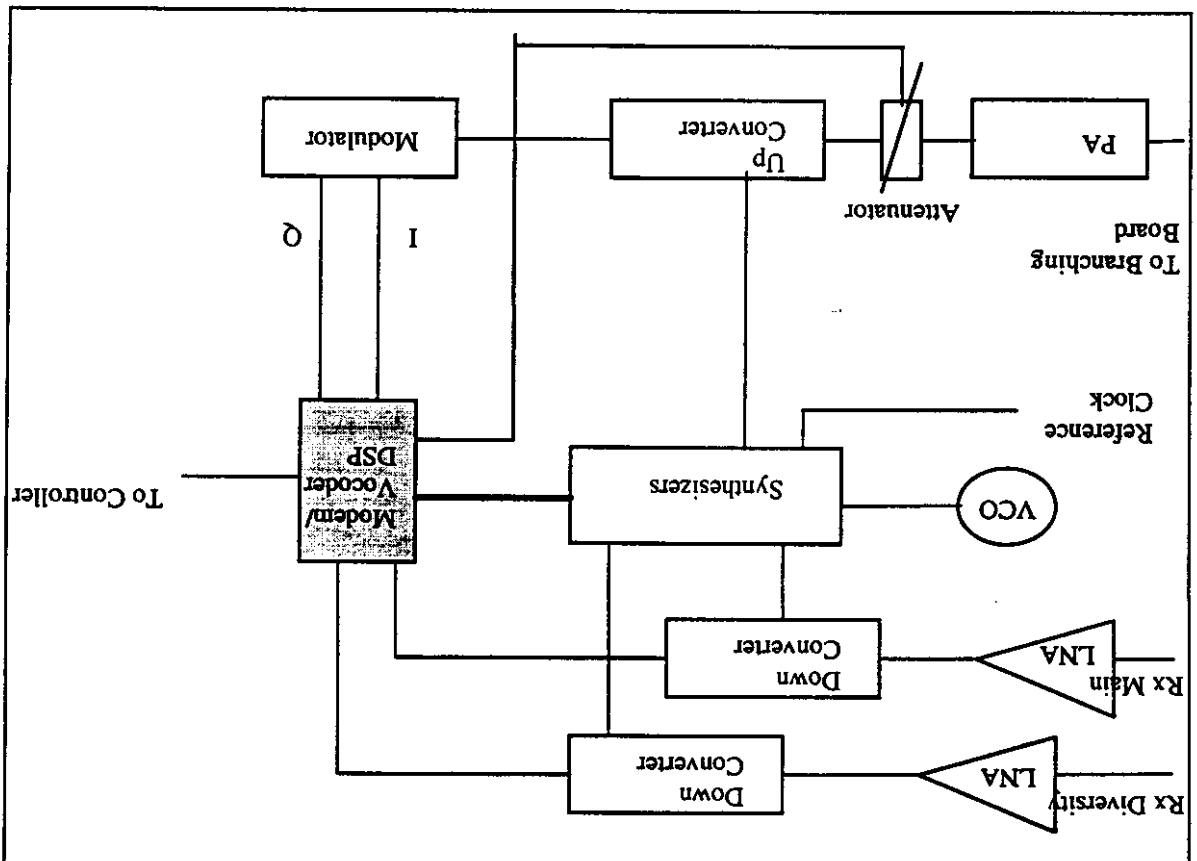
The Modem portion of the DSP card has three DSPs, several A/D devices, one D/A, and a CPLD to write the data received from the radio to the IDMA memory in DSP1 via a parallel bus. Although these two DSPs split functions between each other, DSP1 is the master. DSP1 controls DSP2 by writing commands or data to the IDMA memory of DSP2. The DSP1 communicates with the controller module using the assigned bus.

The high level block diagram of Enhanced Modem DSP hardware is shown in Figure-6.

5.2.2.1 Enhanced Modem Hardware

5.2.2 Enhanced Modem

Figure-5 Transceiver Functional Block Diagram



5.3 Scanning Receiver

Physically, the scanning receiver is similar to the radio, except its transmitter is not present (shown in Figure-7). Also, the diversity receiver is configured for reception on the downlink (Base Station transmit) band and uplink band (Mobile Station transmit). The main receive path of the antenna is connected to the Uplink and the Diversity Receive path is connected to the downlink for the scanner. The scanning receiver can also be ordered by the WOSC to measure the RSSI on any specific uplink or downlink frequency. The WOSC uses these results to assist its handoff operation and selection of usable frequencies at installation time.

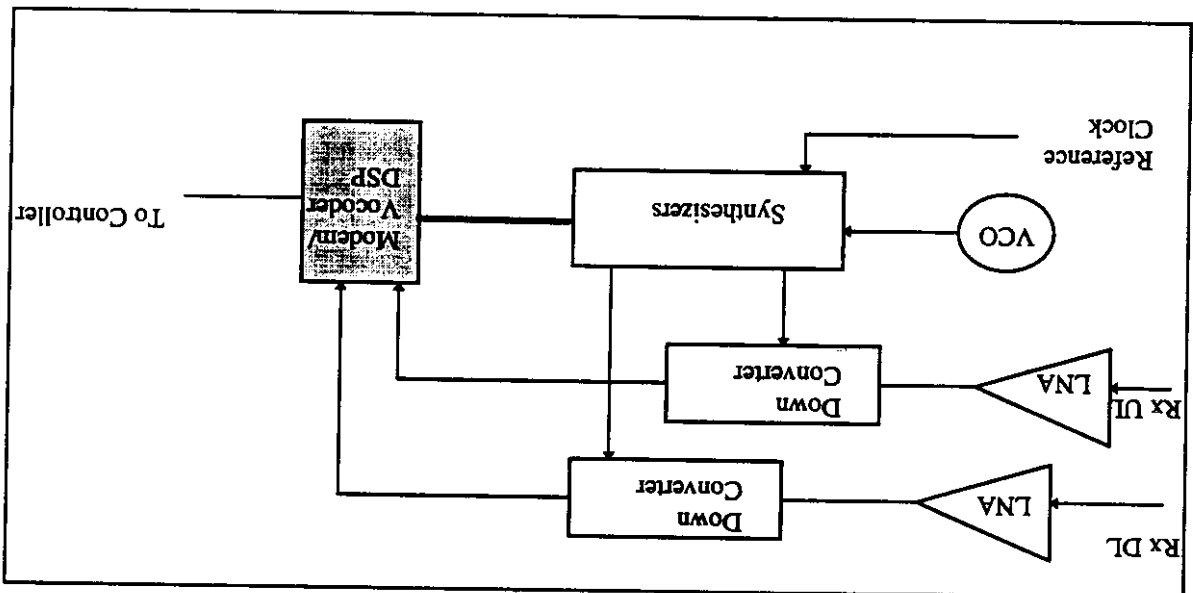


Figure-7 Scanning Receiver Functional Block Diagram

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6. Back Plane

The back plane contains the connectors, serial buses, and parallel communication buses required to tie the whole system together. The serial bus has 32 time slots, which are used for communication between modules, mainly between the BTS controller and radios.