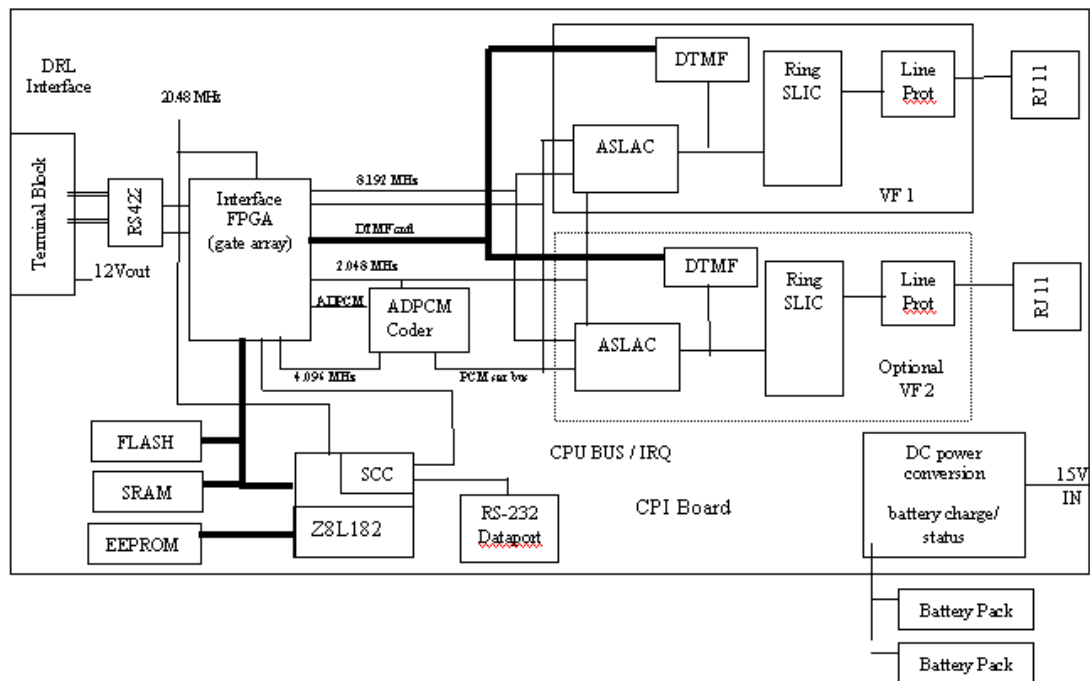


# NERA

## The Customer Premises Interface (CPI)

The CPI is broken into several major design parts – the power supply, the microprocessor and memory section, the FPGA and clock recovery, and the VF Interface. The power supply performs the DC-DC and ring voltage generation. The processor is used for system communication of status and control data to the RU and beyond, for local configuration control, and for message base signaling. An FPGA is used for control and processing of the data stream. This chip will provide bus buffering, status and control gathering of the VF Interface, control clock recovery, and perform Manchester decoding of the receive data stream.. The VF interfaces are used to convert the digital PCM channels to a standard POTS 2 wire interface. It provides Ring signal, analog to digital voice conversion, and DTMF tone generation/reception.



### CPI Block Diagram

The power for the CPI unit is generated by a standard CSA approved AC to 15VDC wall transformer designed for the customer's premises. This alleviates the problem of designing multiple adapters for the various countries using the product. Power supplied to the CPI will accommodate circuitry for two VF pairs (standard POTS) and the Dataport Interface.

The 15 volt power adapter will supply the current required to run the RU, CPI, and battery charger. 15 to 18 volt is required to properly charge the battery. The CPI will accept 11 to 18 volts, as will the RU. If the voltage drops below 11.5, a low voltage alarm will be generated, indicating an inevitable link failure. When the battery falls below 11 volts, the battery is turned off. This prevents totally discharging the battery.

There are 3 switching power supplies on the CPI used to generate the power for the board. The first switcher generates the 5V used to run the digital voice chips and RS232 transceiver. A linear regulator is used to regulate the 5V down to 3V for all the remaining digital circuits. These two power sources remain active as long as the AC/DC power pack is running.

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The other two switchers are controlled by the micro. The high voltage switcher generates –24 and –59 volts to run the ringing SLIC. This circuit is turned on when the low voltage power and digital section has been checked and operation is verified. The RU does not have to be running for this operation. The last switcher powers the battery charger and only operates when the AC/DC is running with a low battery attached. The switcher will run until the battery no longer charges. It generates a voltage of 13.65 volts and is current limited to 500ma. This switcher is also affected by the load current of the system. If the charge current required exceeds the available 1.5A current of the AC/DC unit, the battery charger will reduce its output current to prevent the overloading of the AC/DC power pack.

If no battery pack is used, the DC input will be routed to internal and external power converters. The internal DC-DC power converters are those described above. These switchers after filtering, takes in the nominal DC level and actively generates the following 4 voltages –

1. a -59V DC output at 45ma required to run the ringing SLIC
2. a –24V DC output at 64ma for OFF-Hook operation
3. a +5V DC output at 160ma to run the DTMF and codec circuitry
4. a +3.3V DC output at 375ma to run the digital circuits

The external power converters are located in the RU unit. Power requirements for the RU is a nominal 12V DC at 0.75 amps. This line is filtered, fused and externally lightning protected. Additional power information for the RU is described in the RU board specification.

If a battery pack is used, the pack plugs into the side of the CPI unit as an external device. Up to 8 hrs of backup will optionally be available. If more than this is required, the customer will be responsible for the backup. An automatic switchover circuit will be provided that selects either battery or converted AC. The battery charging will occur, if needed, whenever the battery has dropped below its nominal charged voltage. Current limited charging will be used to minimize the load on the AC/DC power pack.

## The Radio Unit (RU)

The design is based on single board with stuffing options for radio modem functions and

The benefits of this architecture are as follows:

- External antenna. Integrated into the RU for standard deployment. Optional external deployment for special gain situations
- Separation of the CDMA radio functions (and antenna) from the VF interface results in greatly reduced weight, size, and thermal load. This reduces the cost for packaging and mounting of the radio unit.
- The digital link between the RU and CPI allows for deployment separation up to 300 feet. By keep the CPI either within the customer premise or mounted just outside the customer premise, sort loop VF interface technology can be used, saving both cost and power dissipation. (note: battery backup can at best operate –20 C to +50 C as opposed to worst case industrial temperature of –40 C to +85 C)
- Use of a commercial off the shelf AC to DC power converter eliminates engineering and testing support.

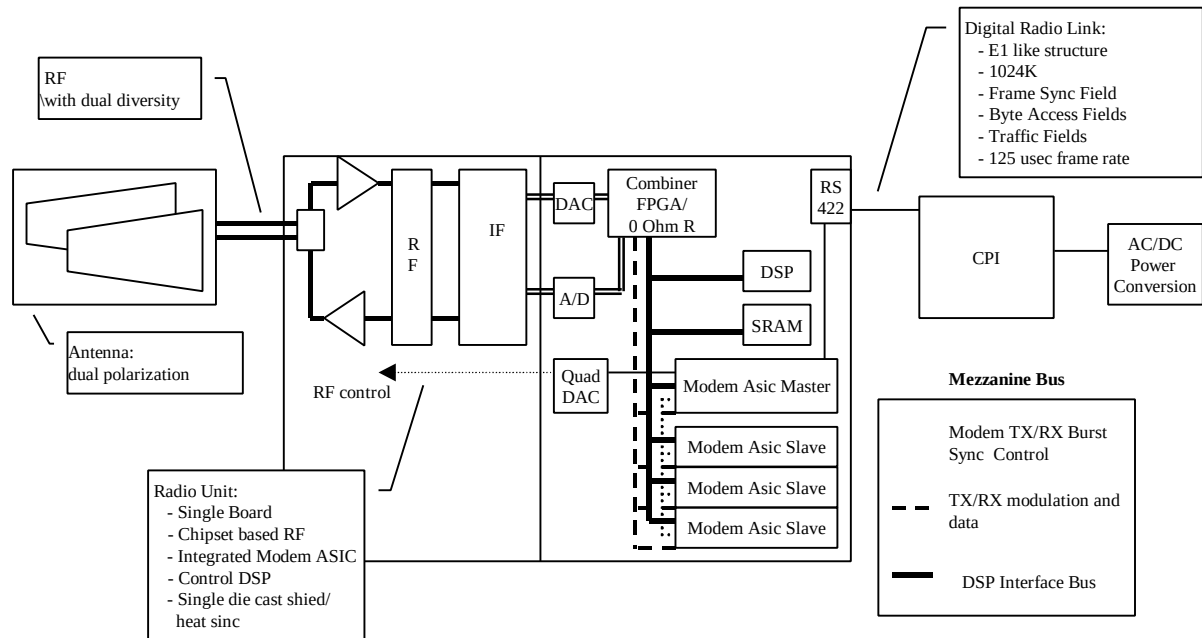


Figure 4.1 Subscriber Terminal Block Diagram

Figure 4.2 provides a more detailed diagram of the RU board.

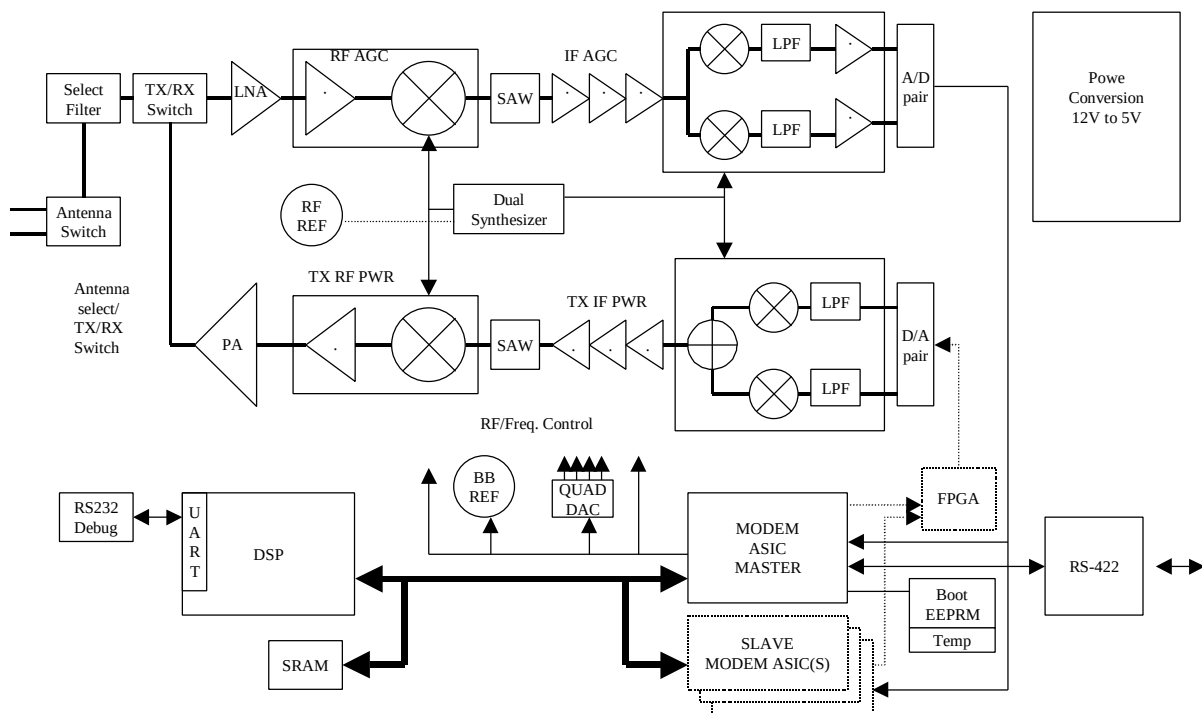


Figure 4.2 RU board (detailed)

When deployed, the RU would be mounted either directly to the customer premise or on a mast that is mounted directly in the ground or to the customer premise. The DRL cable provides shield twisted pairs and power and ground conductors to provide both power and the digital link to the

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CPI with lightning protect termination. In addition, a lightning ground wire must be run from the RU up to earth ground along the shortest possible path.

Ideally, the CPI would be located inside the customer premise for reduced thermal load and optimal battery operation. In this scenario, a lightning protection termination panel would be placed outside the customer premise and the 6 wires: (2 RS 422 pairs, power, and ground,) would be brought into the house and connected to the CPI. The CPI would then provide one or more VF pairs to the customer premise via RJ-11 interfaces. DC power (typically 15 Volts) would be supplied by an external off the shelf power supply. Battery backup would be optional and based on a modular stacked mechanical arrangement so that the customer could incrementally add backup capability (and reduce the cost). Charging facilities and voltage conversion will be provided in the CPI board.

In a number of cases, the service provider may prefer outdoor installation for CPI. In these instances, the indoor CPI can be mounted in small outdoor enclosure attached to the customer premise at additional cost. Proper thermal management (heat sinking) and potential sun screening will be required to ensure operating temperatures are not exceeded.

From an operational point of view, the RU provides a remote wireless interface that is fully synchronized to the network interface at the base station. The WLL Air Interface provides complete bi-directional transport facilities to provide radio and operations overhead, voice/data traffic, and signaling to the subscriber. The standard customer interface (VF, ISDN, V.35 data) is regenerated at the CPI.