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<u>FCC ID</u>**: LLB 8877**

<u>PREVIOUS TYPE ACCEPTANCE</u>

The radio transmitter submitted **(LLB8877)** herein is used as a telemetry device for the reading of utility meters.

An operationally identical device **(LLB8877)** was previously submitted for Type Acceptance and received a Grant of Type Acceptance on **March 4, 1998**.
This earlier version has been in field service since the grant was issued.
Later, identical Hexagram transmitter (**LLB6327)** received a Grant of Type Acceptance.

The product described in this application **(LLB8877)** is modified version of **LLB6082.**
The block diagram and basic circuit configuration of the new product is identical to that of the original **LLB6082 (and LLB6372).**
As detailed in Exhibit D "Description of Operation, the semiconductor lineup has been changed from LLB6327 device in order to accommodate new application requirements, such:
- Efficient RF power Amplifier
- New form of Enclosure,
- PC Board layout to accommodate new enclosure

Also, attached is a "Statement Concerning Compliance with Section 90.203 (j) (3)".
The identical statement was submitted with the application for Type Acceptance of the earlier **LLB6082** device.

STATENET CONCERNING COMPLIANCE WITH
SECTION 90.203(J)(3)

Introduction

Section 90.203 (j)(3) of the Commission's Rules on transmitters provides, in pertinent part:

> If the equipment [in the 150-174 and 421-512 MHz bands] is capable of transmitting data and has an overall bandwidth of 6,25 kHz or more, the equipment must be capable of supporting a minimum data rate of 4800 bits per second per 6.25 kHz of bandwidth.[1]

Three parties interested in remove utility metering sought reconsideration of this provision to allow alternative showings of spectrum efficiency for low power frequency reuse systems.[2]

The commission replied:

> [W]e will provide manufacturers with additional flexibility to design spectrally efficient transmitters. **The commission's Equipment Authorization Division may, on a case by case basis, grant type acceptance to equipment with slower bit rates than specified in Section 90.203(j)(3) and 90-203(j)(5)** of our rules, provided that an acceptable technical analysis is submitted with the application, which demonstrate that the slower data rate will provide spectral efficiency than the standard data rate.[3]

The present application is for automatic remote meter equipment, and falls squarely within the scope of this exception. When considered as part of a system, the device in question provides spectrum efficiency and channel utilization far excess of 4800 bits/sec per 6.25 kHz.

Technical Analysis

The device submitted for type acceptance is a Meter Transmitter Unit (MTU). When the system is implemented, an MTU is attached to each utility meter. The MTU periodically transmits meter readings omni-directionally in transmissions lasting under one-tenth second each. Transmissions from different MTUa are independent and uncorrelated.

Data-collector Units (DCU) are mounted on a nominal 1 mile grid. A DCU receives and stores the transmissions from all the MTUs in its range. Once, daily, each DCU transfers the accumulated data to a central computer at the utility office via a cell phone mounted on the DCU.

MTU bandwidth is 12.5 kHz, so a strict application of section 90.203(j)(3) would require the equipment to support a data rate of 9600 bits/sec. In fact, to minimize component cost and bit error rate, an individual MTU transmits at rate of 1200 bits/sec. The system achieves spectrum

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[1]   47 C.F.R. para 90.203(j)(3). This provision governs Part 90 type acceptance applications filed from August 1, 1996, through December 31, 2004.

[2]   Replacement of Prt 90 by Part 88 to revise the private Land Mobil Radio Services, 11 FCC Rcd 17676, 17686 (1996).

[3]   *Id.,* 11 FCC Rcd at 17687 (emphasis added).

efficiency not through a high bit rate in each individual MTU, but through a high level of frequency re-use achieved by deploying a large number of low-power short range transmitters.

As detailed in the Appendix, a typical large installation of MTUs on a single 12.5 kHz channel can support data rates exceeding 100,000 bits/sec. This performance represents spectrum efficiency far in excess of that required under Section 90.203(j)(3). Where a typical commercial user of private land mobile radio spectrum, such as a delivery service, requires a pair of channels to provide two-way communication with dozens of trucks at most, the MTU is a part of a system that uses a single channel to service millions of users and to carry data representing billions of dollars in annual revenue. This is an extremely efficient use of the spectrum, and is consistent with the Commission's purposes underlying Section 90.203(j)(3).

An operationally identical MTU (**LLB6082**) received a grant of Type Acceptance on **March 4, 1998**. Automatic Meter Reading Systems incorporating this technology have been in service since **March 4, 1998** and have incorporated tens of thousands of transmitters. The MTU described in this application for Certification represents an improved product.

An earlier product (LLB5155) operating under the Commission rules then in effect has been in service at hundreds of locations since May of 1996.

Public Interest Considerations

Public interest considerations support the development of Automatic Meter reading equipment, such as the device in question. Automatic Meter Reading equipment directly helps to keep consumer rates down in the time of rapidly increasing labor cost. The alternative, traditional door-to-door meter reading, is not only much more expensive, but dangerous for the meter readers, and necessarily exposes consumers to potential security risk in their homes.

Equally important in a pro-competitive regulatory environment, Automatic Meter Reading equipment makes possible time –of-use billing, under which a customer's utility rate varies with time of day or day of the week. Electric time-of-use billing, for example, typically requires a meter read every 15 minutes, which is not feasible without Automatic Meter Reading equipment. Frequent meter-reading is an important component of utility deregulation, because it enables new competitors to tailor service and rates to particular niche markets, profiles of demand, and competitive situations. Furthermore, by maximizing the efficient use of existing utility plans, time of use billing furthers both economic and conservation goals.

The capability for automatic meter reading has other advantages as well. It permits detection of water leaks through the prompt recognition of abnormal consumption patterns. And once a system is installed for utility metering, it can also be used to transmit alarm data for such emergencies as fire, smoke, gas leak, water accumulation, and unauthorized intrusion. The same system can also be used to remotely monitor utility distribution equipment such as valves and sensors.

Conclusion

We respectfully submit that Commissions spectrum policy and the public interest are well served by calculating the spectrum efficiency of this equipment in terms of an integrated system that incorporates a large number of MTUs.

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Lawrence M. Sears
Director of Technology
September 10, 2003

APPENDIX

CALCULATION OF SYSTEM SPECTRUM EFFICIENCY

Assumptions

1. Large urban area (5-10 million people) containing five million meters. This assumes 2-3 meters per average household of 2-4 individuals, and covers an area approximately equal to that served by a conventional Part 90 base station.

2. 5 million MTUs and 1,000 DCUs.

3. 24 meter-reading (transmissions) per a day. This includes more frequent readings for time-of –use billing averaged into less frequent readings for other services.

4. Each transmission contains 92 bits and has duration of 77 milliseconds.

Calculations (all first order approximations)

1. Determine probability of collision:

$$\frac{5000MTU}{per.DCU} x \frac{0.077\sec}{per.transmission} x \frac{24transmission}{per.24hours} x \frac{24hours}{(8.6x10^4)\sec} = 0.11$$

0.11 is the ratio of the time that some MTU in a range of given DCU is actively transmitting. To the first approximation, 0.11 is also the probability that the channel is occupied in the vicinity of the local DCU when given MTU attempts to transmit. Note, however, that because the DCUs are distributed over a wide area, many MTUs can transmit simultaneously without collision. Thus, the channel can support very large data loads without collision. This is a result of the MTUs having a short transmission range compare to the area served by the channel.

2. Determine overall system bandwidth:

$$(5x10^6 MTU)x \frac{92bits}{per.transmission} x \frac{24transmissions}{per.24hours} x \frac{24hours}{(8.6x10^4)\sec} = 128Kbps$$

3. Reduce baud rate by expected collision percentage:

$$(128Kbps)x(1-0.11) = 114Kbps$$

4. **Overall supportable system bandwidth = 114 Kbits per second. This is the data load handled by this system covering an area comparable the that served by a conventional base station authorized under Section 90.203(j)(3).**