

BNR INC.

EXHIBIT NO. 1

**This is a request for Experimental License Authorization under Section 5.202 (i) of the regulations for the development of radio technique, equipment, operational data or engineering data related to an existing or proposed radio service.**

**Particulars of Operation**

The Microcell Live Air Testing program will be a continuous experimental development program used to develop new and improved radio communication systems and equipment. The test program will focus primarily upon developing microcell systems inside buildings that will expand the versatility of Cellular radio equipment and will improve the spectrum efficiency of Cellular systems. BNR will closely coordinate testing with the A and B Cellular operators to avoid interference and to improve the next generation of Cellular equipment.

**Frequencies Used**

Initially BNR plans to test on the following Cellular frequencies:

877.110 MHz -- Channel #237  
877.740 MHz -- Channel #258  
878.370 MHz -- Channel #279  
879.000 MHz -- Channel #300  
890.340 MHz -- Channel # 678  
890.970 MHz -- Channel # 699  
869.550 MHz -- Channel # 1008

The testing program will not use more than seven (7) Cellular channels during any period of time. However as the Dallas area Cellular A and B operators may need to revise spectrum usage for their customer needs from time to time, BNR seeks authority to test in the Cellular spectrum in the following ranges; 824 to 849 MHz and 869 to 894 MHz.

**Maximum R.F. Output**

The maximum R.F. output of portable transmitters will not exceed the power limitation for commercially available cellular phones, being six hundred (600) milliwatts. All portable transmitters used in the testing program will transmit with power of six (6) milliwatt (7.8dBm) or less.

Base station maximum output is 1W at the transmitter. Maximum ERP at antenna will be 12dBm.

The radio signal strength from base station emissions measured 100 meters outside the building shall be -95dBm or less.

**Maximum Effective Radiated Power (from the antenna)**

12dBm

**"Mean" or "Peak"**

Mean

**Type of Modulation**

Standard Cellular AMPS operation, FM

**Description of Necessary bandwidth**

Standard Cellular AMPS operation, 30kHz

**Summary of Technical Information**

A 16.5 dB clutter loss due to buildings was included in the calculations of the expected received signal strength. The ERP used at the testing sight is the maximum available using the equipment provided by Novatel. The cell site specific data is as follows:

Latitude	32° 58' 47" N
Longitude	96° 42' 36" W
Site Elevation at Ground Level	649' (197.82 Meters) (above sea level)
Peak Building Height (NT Tower)	884' (289.44 Meters) (above sea level)
Antenna Height (BNR Building)	35' (10.67 Meters) (max height, inbuilding)
Antenna Height (NT Tower)	60' (18.29 Meters) (max height, inbuilding)
Antenna Type/Gain	Directional; 6dB Gain
TX Line Length (BNR Building)	300 Feet
TX Line Length (NT Tower)	600 Feet
Transmitter Power	1 watt (Maximum)
Combiner Loss	10 dB
Duplexer Loss	2 dB
TX Line Loss (0.5" inch foam)	7.2 dB (BNR Building)
TX Line Loss (0.5" inch foam)	14.4 dB (NT Tower)
Connector Loss	2.5dB
Attenuator range	1-10dB
ERP	12dBm

The test location is the BNR/NT office complex, composed of a three story BNR building whose street address is 2201 Lakeside Blvd., Richardson, Tx., and the connected fourteen story NT tower whose street address is 2221 Lakeside Blvd., Richardson, Texas. Both buildings have the same Latitude and longitude coordinates. In the NT Tower, the RF will only be radiated within the 5th floor, at a height of 60 ft above ground level.

The Test location is on the East side of U.S. Highway 75 (a/k/a Central Expressway). There are numerous office buildings (whose total heights above sea level are higher than the maximum height of antennas to be used in the test) that are located between the test sight and the nearest aircraft landing area. Further natural formations and trees between the test sight and the nearest aircraft landing area will tend to shield the antenna from aircraft and minimize the aeronautical hazard to aircraft.

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EXHIBIT NO. 2

BNR INC. is the Research and Development Subsidiary of Northern Telecom, which is one of the largest manufacturers of telecommunication equipment in the World. As part of the world wide development of enhanced telecommunication equipment the Richardson laboratory is initiating an in-depth testing program to develop microcell equipment that will use traditional cellular frequencies, for inbuilding, low-power cellular uses and operation. Microcell development can increase the versatility of Cellular equipment for the general population and can increase the spectrum efficiency of equipment using the frequency channels allocated to the A and B cellular providers in the United States.

The R&D program will test in-building, low-power, microcell systems for radios operating in the current cellular spectrum bands. The program will include in-depth testing of the following three major areas for microcell systems:

- 1) Inbuilding RF propagation for the United States Cellular spectrum.
- 2) Coexistence of inbuilding, low-power, transmissions with the existing Celco Macrocell systems.
- 3) Determination of spectrum re-use factors for Microcell applications.

The testing will be conducted entirely within the new 1,000,000 sq. ft. BNR/NT complex located at 2201 and 2221 Lakeside Blvd., Richardson, Texas.

The testing program will initially use the following equipment:

1. NT40 based MTSO switch including the Intelligent Cellular Peripheral (ICP)
2. One (1) Cell Site ICRM based Controller
3. Eight (8) NT Radios operating at 1 watt max. The maximum ERP at the antenna will be 12dBm.
4. Associated cellsite equipment :
  - High stability Master Oscillator, 4.8MHz, providing a stable clock source for the radios to synthesize their RF channels.
  - Broadband Transmit Combiner, isolators, filters, duplexer
  - Receive Multicoupler, splitters and filters
  - Cell Site Monitor to monitor presence of the control channel
  - Commercial power supplies
5. Multiple indoor low power antenna locations inside the BNR and NT buildings

As the test program matures as many as 32 Motorola MicroTak® handsets may be used in the test program, together with a variety of commercially available cellular telephones.

The program objectives include developing new equipment and techniques for microcell systems. The test program will explore methods to provide complete inbuilding coverage for users without requiring an excessive number of base stations within the building. It is important to test different RF propagation environments under different conditions, and characterize the RF propagation

inside buildings under different conditions. To maximize efficiency it is critical to control the spillage of the RF to ensure that the same spectrum can be reused within as short of a distance as possible to provide coverage to business offices while using as few cellular channels as possible.

Microcell technology developed from the program will provide economic inbuilding services while avoiding conflict with external cellular macrocell systems.

The reasonable promise of contributing to radio art includes future systems that will greatly expand the number of customers that can use the cellular frequencies while being served by a system that greatly expands the efficiency and versatility of radio communication.