

United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
SPECIAL TEMPORARY AUTHORIZATION

<u>EXPERIMENTAL</u> (Nature of Service)	<u>K O 2 X E U</u> (Call Sign)
<u>XD FX & MO</u> (Class of station)	<u>S-1029-EX-93</u> (File number)
NAME <u>ENR, INC.</u>	
Vicinity of <u>Richardson, TX</u> (Location of station)	

Special Temporary Authority is hereby granted to operate the radio transmitting apparatus described below:

Frequency MHz	Authorized Power (watts)	Emission Designator
824-849	600 milliwatts	30K0F9W
869-894	1 (output)	30K0F9W

All operation must be coordinated with and agreed to by the cellular licensee in the area of operation.

This special temporary authorization is granted upon the express condition that it may be terminated by the Commission at any time without advance notice or hearing if in its discretion the need for such action arises. Nothing contained herein shall be construed as a finding by the Commission that the authority herein granted is or will be in the public interest beyond the express terms hereof.

This special temporary authorization shall not vest in the grantee any right to operate the station nor any right in the use of the frequencies designated in the authorization beyond the term hereof, nor in any other manner than authorized herein. Neither the authorization nor the right granted hereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934. This authorization is subject to the right of use of control by the Government of the United States conferred by Section 706 of the Communications Act of 1934.

This authorization effective February 22, 1993 and
will expire 3:00 A.M. EST. May 22, 1993

**FEDERAL
COMMUNICATIONS
COMMISSION**

COMMUNICATIONS REQUEST

Date: February 9, 1993

To: **Ms. Morrissey in
Mr. Frank Wright's Office**

Location: FCC Washington, D.C.

Facsimile Number: (6) 202-653-8773

Number of Pages to Follow:

From: Mel Hacker

Telephone: **(615) 734-4313**

FAX: (615) 734-4109

**URGENT MESSAGE - Deliver As Soon as
Possible**

Dear Ms. Morrissey:

Attached is the information we discussed earlier. Thank you for your help.

Very truly yours,

Melvin E. Hacker
Regulatory Agency Manager
Northern Telecom Inc.
200 Athens Way
Nashville, TN 37228

Approved by OMR
3060-0440
Expires 12/31/90

FEDERAL COMMUNICATIONS COMMISSION
FEE PROCESSING FORM

FOR
FCC
USE
ONLY

Please read instructions on back of this form before completing it. Section I MUST be completed. If you are applying for concurrent actions which require you to list more than one Fee Type Code, you must also complete Section II. This form must accompany all payments. Only one Fee Processing Form may be submitted per application or filing. Please type or print legibly. All required blocks must be completed or application/filing will be returned without action.

SECTION I

APPLICANT NAME (Last, first, middle initial)

BNR INC.

MAILING ADDRESS (Line 1) (Maximum 35 characters - refer to Instruction (2) on reverse of form)

P.O. Box 833871

MAILING ADDRESS (Line 2) (if required) (Maximum 35 characters)

CITY

Richardson

STATE OR COUNTRY (if foreign address)

TX

ZIP CODE

75083-3871

CALL SIGN OR OTHER FCC IDENTIFIER (if applicable)

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in FCC Fee Filing Guides. Enter in Column (B) the Fee Multiple, if applicable. Enter in Column (C) the result obtained from multiplying the value of the Fee Type Code in Column (A) by the number entered in Column (B), if any.

(A)

(B)

(C)

FEE TYPE CODE

FEE MULTIPLE
(if required)FEE DUE FOR FEE TYPE
CODE IN COLUMN (A)

FOR FCC USE ONLY

(1)

E A E*** 35.00****SECTION II** — To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)

(B)

(C)

FEE TYPE CODE

FEE MULTIPLE
(if required)FEE DUE FOR FEE TYPE
CODE IN COLUMN (A)

FOR FCC USE ONLY

(2)

\$

(3)

\$

(4)

\$

(5)

\$

ADD ALL AMOUNTS SHOWN IN COLUMN C, LINES (1) THROUGH (5), AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED
WITH THIS APPLICATION
OR FILING

\$

FOR FCC USE ONLY

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Approved by OMB
 3060-0065
 Expires 12/31/92

Public reporting burden for this collection of information is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Paperwork Reduction Project (3060-0065), Washington, DC 20503.

**APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5
 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER) THAN BROADCAST)**

A. Applicant's Name and Post Office address
 (Give street, city, state, and ZIP Code. See Instruction No. 4)

BNR, INC.
 2201 Lakeside Blvd.
 Richardson, TX 75082-4399

DO NOT WRITE IN THIS BLOCK

File No.

2.(a) Application for (check only one box)

☒ New Station ☐ Modification of existing authorization

2.(b) For Modification indicate below

File No. Call Sign:

3. Application for modification indicate change in (check all that apply)

☐ Frequency ☐ Emission ☐ Power ☐ Location

☒ Other particulars (describe below or in attached Exhibit No. 1)

4. Particulars of Operation (See instructions below)

Frequency (State Whether kHz or MHz) (A)	POWER			EMISSION (E)	MODULATING SIGNAL (F)	NECESSARY BANDWIDTH (kHz) (G)
	(B)	(C)	(D)			
	Please refer to Exhibit No. 1					

- (A) List each frequency or frequency band separately. (If more space is required, attach as Exhibit No. 1)
- (B) Insert maximum R.F. output power at the transmitter terminals. Specify units.
- (C) Insert maximum effective radiated power from the antenna (If pulsed emission specify peak power)
- (D) Insert "MEAN" or "PEAK" (See definitions in Part 5).
- (E) List each type of emission separately for each frequency. (See Section 2.201 FCC Rules.)
- (F) Insert as appropriate for the type of modulation:
- (1) the maximum speed of keying in bauds;
 - (2) maximum audio modulating frequency;
 - (3) frequency deviation of carrier;
 - (4) pulse duration and repetition rate.
- For complex emissions, describe in detail in the space provided below
- (G) Describe how the necessary bandwidth was determined in space provided below

Please refer to Exhibit No. 1

State Proposed location of transmitter and transmitting antenna (Check only one box): FIXED-BASE ☐ MOBILE ☒ BASE & MOBILE											
(b) If permanently located at a fixed location, give below: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Site TX</td> <td style="width: 33%;">County Dallas</td> <td style="width: 33%;">City or Town Richardson</td> </tr> <tr> <td colspan="3">Number and street (or other indication of location) Refer to Exhibit No. 1</td> </tr> </table>			Site TX	County Dallas	City or Town Richardson	Number and street (or other indication of location) Refer to Exhibit No. 1			(d) If mobile, describe the exact area of operation: 		
Site TX	County Dallas	City or Town Richardson									
Number and street (or other indication of location) Refer to Exhibit No. 1											
(c) Geographical coordinates exact to the nearest second: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">North Latitude 32° 58' 47"N</td> <td style="width: 33%;">West Longitude 96° 42' 36"W</td> </tr> </table>			North Latitude 32° 58' 47"N	West Longitude 96° 42' 36"W	(e) Geographical coordinates of the approximate center of proposed area of operation (mobile applications): <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">North Latitude "</td> <td style="width: 33%;">West Longitude "</td> </tr> </table>			North Latitude "	West Longitude "		
North Latitude 32° 58' 47"N	West Longitude 96° 42' 36"W										
North Latitude "	West Longitude "										
6. Is a directional antenna (other than radar) used? ☒ Yes ☐ No If "YES", give the following information: (a) Width of beam in degrees at the half-power point <u>80</u> (b) Orientation in horizontal plane <u>105</u> (c) Orientation in vertical plane <u>80</u>											
7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a narrative statement describing the government project, agency, and contact number.											
8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, the following information: (a) The contract number and the name of the foreign government concerned.											
9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project). ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a narrative statement providing the following information: (a) A description of the nature of the research project being conducted. (b) A showing that the communications facilities requested are necessary for the research project involved. (c) A showing that existing communications facilities are inadequate.											
10. If all the answers to Items 7, 8, and 9, are "No", attach as EXHIBIT No. <u>2</u> , a narrative statement describing in detail the following: (a) The complete program of research and experimentation proposed including description of equipment and theory of operation. (b) The specific objectives sought to be accomplished. (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.											
11. (a) Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application. (b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required. 2 years											
12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? ☐ Yes ☒ No If you answer yes, submit an Environmental Assessment required by Section 1.1311.											

MANUFACTURER	TYPE	NO. OF UNITS
NT Switch	NT40	1
NT Radios/Transceivers	DRU	8

14. Is the equipment listed in Item 13 capable of station identification pursuant to Section 5.142?

☐ Yes ☒ No

15. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?

☒ Yes ☐ No

If "Yes", give the following (See Instruction 9):

(a) Overall height above ground to tip of antenna is _____ meters. Refer to Exhibit No. 1 (649 feet)

(b) Elevation of ground at antenna site above mean sea level is 197.82 meters

(c) Distance to nearest aircraft landing area is (7.5 miles) 12.07 kilometers.

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna.

Refer to Exhibit No. 1

(e) Submit as EXHIBIT No. _____, a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.

16. Applicant is (check only one box)

☐ Individual ☐ Association ☐ Partnership ☒ Corporation

☐ Other (describe below)

17. Is applicant a foreign government or a representative of a foreign government?

☐ Yes ☒ No

18. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission?

☐ Yes ☒ No

If "Yes", attach as EXHIBIT No. _____ a statement giving call sign of license or permit revoked and relate circumstances.

19. Will applicant be owner and operator of station?

☒ Yes ☐ No

20. Give name, title, and telephone number (include area code) of person who can best handle inquiries pertaining to this application.

Ali Karim
Manager, Microcell Development
(214) 684-7432, Fax (214) 684-3748

21. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.

Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form
1	4, 5, 15				
2	10				

22. CERTIFICATION

ATTENTION: Read this certification carefully before signing this application.

THE APPLICANT CERTIFIES THAT:

- (a) Copies of the FCC Rules Parts 2 and 5 are on hand; and
- (b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
- (c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- (d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission
 - (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
 - (2) that the applicant will be authorized to operate on any basis other than experimental, and
 - (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

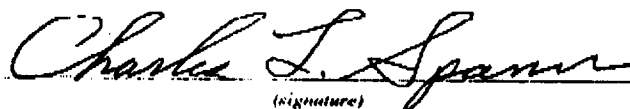
- (e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- (f) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- (g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this 8th day of January, 1993

Name of Applicant BNR, INC.

(correspond with name given on page 1)

By Charles L. Spann
(print)


(signature)

Title Telecommunications Regulation Analyst

WILLFUL FALSE STATEMENTS MADE ON THIS FORM
ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S.
CODE, TITLE 18, SECTION 1001.

Check Appropriate Classification:

- ☐ Individual Applicant
- ☐ Member of Applicant Partnership
- ☐ Office of Applicant Corporation or Association
- ☒ Authorized Employee

**NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980**

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specifically by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to Section 0.459 of FCC Rules and Regulations. Your response is required to obtain this authorization.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552(a)(3), and the Paperwork Reduction Act of 1980, P.L. 96-511, December 11, 1980, 43 U.S.C. 3507.

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.

BNR INC.**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.



Northern Telecom Inc. P. 5/1816/134777
Northern Telecom Plaza
200 Athens Way
Nashville, TN 37228-1397
TWX 810-371-1206
Telex 554388

*7-12-93
FILE*

April 23, 1993

Mr. H. Franklin Wright
Frequency Liaison Branch Chief
Federal Communications Commission
2025 M Street
Washington, DC 20554

Subject: Experimental Radio License for In-Building MicroCell
Product Development Testing

Dear Mr. Wright:

Attached hereto is the application for an Experimental Radio License to conduct MicroCell product development for Cellular radio systems. Bell Northern Research (BNR) and Northern Telecom currently have Special Temporary Authorization (STA- File Number 5-1029-EX-93; call sign K02XEU), which will expire May 22, 1993, for testing MicroCell systems in frequencies licensed to Cellular providers.

The test program will be conducted, in-building, in the BNR/Northern Telecom complex located at 2201 and 2221 Lakeside Blvd., in Richardson, Texas. BNR/Northern Telecom will coordinate testing activity with current Cellular providers to avoid interference with current Cellular service. The test activity will use very low power handsets and base stations that will avoid interference problems with existing Cellular service in the area.

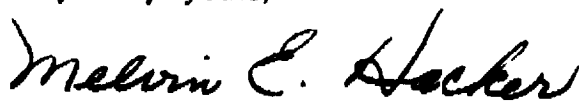
The test program has identified unique methods of deploying low-power base stations to achieve full in-building coverage with significantly less radiated power from the base stations. The test program will provide the opportunity for BNR/Northern Telecom to develop new, in-building wireless systems for Cellular operators. The wireless systems will permit Cellular operators to make more efficient use of their allocated spectrum, and significantly expand their customer base with their existing frequency allocation.

BNR/Northern Telecom is one of the largest communication manufacturers in the world, with approximately 22,000 employees in the United States and approximately 3,200 employees in Richardson, where the test program is conducted.

Mr. Wright
April 23, 1993
Page 2

Please call me on (615) 734-4313 in the event that you have any questions concerning this application. Should you desire to reach me by FAX, the number is (615) 734-4109. Check number 51612 in the amount of \$35.00 is enclosed.

Very truly yours,

A handwritten signature in black ink that reads "Melvin E. Hacker". The signature is written in a cursive style with a large, sweeping "M" and a long, trailing "H".

Melvin E. Hacker
Regulatory Agency Manger

/bb

Attachment

Approved by OMB

3060-0440

Expires 12/31/90

FEDERAL COMMUNICATIONS COMMISSION

FEE PROCESSING FORM



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SECTION I

APPLICANT NAME (Last, first, middle initial)

Northern Telecom Inc.

MAILING ADDRESS (Line 1) (Maximum 65 characters - refer to instruction (2) on reverse of form)

200 Athens Way

MAILING ADDRESS (Line 2) (if required) (Maximum 65 characters)

CITY

Nashville

STATE OR COUNTRY (if foreign address)

ZIP CODE

TN 37228-1397

CALL SIGN OR OTHER FCC IDENTIFIER (if applicable)

K02XEU

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in FCC Fee Filing Guides. Enter in Column (B) the Fee Multiple, if applicable. Enter in Column (C) the result obtained from multiplying the value of the Fee Type Code in Column (A) by the number entered in Column (B), if any.

(A)

(B)

(C)

(1)

FEE TYPE CODE

E A E

FEE MULTIPLE
(if required)FEE DUE FOR FEE TYPE
CODE IN COLUMN (A)

\$ 35.00

FOR FCC USE ONLY

SECTION II

— To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)

FEE TYPE CODE

(B)

FEE MULTIPLE
(if required)

(C)

FEE DUE FOR FEE TYPE
CODE IN COLUMN (A)

FOR FCC USE ONLY

(2)

(3)

(4)

(5)

TOTAL AMOUNT REMITTED
WITH THIS APPLICATION
OR FILING

\$

FOR FCC USE ONLY

ADD ALL AMOUNTS SHOWN IN COLUMN C, LINES (1) THROUGH (5), AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Approved by OMB
 3060-0065
 Expires 12/31/92

Public reporting burden for this collection of information is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Paperwork Reduction Project (3060-0065), Washington, DC 20503.

**APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5
 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER) THAN BROADCAST**

A. Applicant's Name and Post Office address
 (Give street, city, state, and ZIP Code. See Instruction No. 4)

Northern Telecom Inc.
 200 Athens Way
 Nashville, TN 37228-1397

DO NOT WRITE IN THIS BLOCK

File No.

2. (a) Application for (check only one box)

☒ New Station ☐ Modification of existing authorization

2. (b) For Modification indicate below

File No.:

Call Sign:

3. Application for modification indicate change in (check all that apply)

☐ Frequency ☐ Emission ☐ Power ☐ Location

☒ Other particulars (describe below or in attached Exhibit No. 1)

4. Particulars of Operation (See instructions below)

Frequency (State Whether kHz or MHz) (A)	POWER			EMISSION (E)	MODULATING SIGNAL (F)	NECESSARY BANDWIDTH (kHz) (G)
	(B)	(C)	(D)			
	Please refer to Exhibit No. 1					

(A) List each frequency or frequency band separately. (If more space is required, attach as Exhibit No. 1).

(B) Insert maximum R.F. output power at the transmitter terminals. Specify units.

(C) Insert maximum effective radiated power from the antenna (If pulsed emission specify peak power).

(D) Insert "MEAN" or "PEAK" (See definitions in Part 5).

(E) List each type of emission separately for each frequency. (See Section 2.201 FCC Rules.)

(F) Insert as appropriate for the type of modulation:

(1) the maximum speed of keying in bauds;

(2) maximum audio modulating frequency;

(3) frequency deviation of carrier;

(4) pulse duration and repetition rate.

For complex emissions, describe in detail in the space provided below.

(G) Describe how the necessary bandwidth was determined in space provided below.

Please refer to Exhibit No. 1

(a) Proposed location of transmitter and transmitting antenna (Check only one box) ☐ FIXED BASE ☐ MOBILE ☒ BASE & MOBILE			
(b) If permanently located at a fixed location, give below State TX County Dallas City or Town Richardson Number and street (or other indication of location) Refer to Exhibit No. 1		(d) If mobile, describe the exact area of operation	
(c) Geographical coordinates exact to the nearest second North Latitude 32° 58' 47N West Longitude 96° 42' 36W		(e) Geographical coordinates of the approximate center of proposed area of operation (mobile applications) North Latitude _____ West Longitude _____	
6. Is a directional antenna (other than radar) used? ☒ Yes ☐ No If "YES", give the following information: (a) Width of beam in degrees at the half-power point 80 (b) Orientation in horizontal plane 105 (c) Orientation in vertical plane 80			
7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a narrative statement describing the government project, agency, and contact number.			
8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, the following information: (a) The contract number and the name of the foreign government concerned.			
9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project). ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a narrative statement providing the following information: (a) A description of the nature of the research project being conducted. (b) A showing that the communications facilities requested are necessary for the research project involved. (c) A showing that existing communications facilities are inadequate.			
10. If all the answers to Items 7, 8, and 9, are "No", attach as EXHIBIT No. 2 , a narrative statement describing in detail the following: (a) The complete program of research and experimentation proposed including description of equipment and theory of operation. (b) The specific objectives sought to be accomplished. (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.			
11. (a) Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application. (b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required. 2 years			
12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? ☐ Yes ☒ No If you answer yes, submit an Environmental Assessment required by Section 1.1311.			

List below transmitting equipment to be installed (if experimental, so state):

MANUFACTURER

TYPE

NO. OF UNITS

NT Mobile Telephone Exchange
NT Radios/TransceiversNT40/ECORE/BRISC
DRU1
8

14. Is the equipment listed in Item 13 capable of station identification pursuant to Section 5.152?

☐ Yes☒ No

15. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?

☒ Yes☐ No

If "Yes", give the following (See Instruction 9):

(a) Overall height above ground to tip of antenna is _____ meters. Refer to Exhibit No. 1 (649 feet)

(b) Elevation of ground at antenna site above mean sea level is 197.82 meters.(c) Distance to nearest aircraft landing area is (7.5 miles) 12.07 kilometers.

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna.

Refer to Exhibit No. 1

(e) Submit as EXHIBIT No. _____ a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.

16. Applicant is (check only one box)

☐ Individual☐ Association☐ Partnership☒ Corporation☐ Other (describe below)

17. Is applicant a foreign government or a representative of a foreign government?

☐ Yes☒ No

18. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission?

☐ Yes☒ No

If "Yes", attach as EXHIBIT No. _____ a statement giving call sign of license or permit revoked and relate circumstances.

19. Will applicant be owner and operator of station?

☒ Yes☐ No

20. Give name, title, and telephone number (include area code) of person who can best handle inquiries pertaining to this application.

Melvin E. Hacker
Regulatory Agency Manager
(615) 734-4313

21. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.

EXHIBITS AND ITEM NO. OF FORM

Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form
1	4, 5, 15				
2	10				

22. CERTIFICATION

ATTENTION: Read this certification carefully before signing this application

THE APPLICANT CERTIFIES THAT:

- (a) Copies of the FCC Rules Parts 2 and 3 are on hand; and
- (b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
- (c) All operations will be on an experimental basis in accordance with Part 3 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- (d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission
 - (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
 - (2) that the applicant will be authorized to operate on any basis other than experimental, and
 - (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

- (e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- (g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this 23rd day of April, 19 93

Name of Applicant Northern Telecom Inc.

(correspond with name given on page 1)

By Melvin E. Hacker

(print)

(signature)

Title Regulatory Agency Manager

**WILLFUL FALSE STATEMENTS MADE ON THIS FORM
ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S.
CODE, TITLE 18, SECTION 1001.**

Check Appropriate Classification:

- ☐ Individual Applicant
- ☐ Member of Applicant Partnership
- ☐ Office of Applicant Corporation or Association
- ☒ Authorized Employee

**NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980**

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specifically by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to Section 0.459 of FCC Rules and Regulations. Your response is required to obtain this authorization.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), and the Paperwork Reduction Act of 1980, P.L. 96-511, December 11, 1980, 44 U.S.C. 3507.

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

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

All portable transmitters used for the in-building 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, and other cellular technologies designed for more efficient utilization of spectrum may be tested (e.g. IS-54 TDMA, IS-95 CDMA).

Description of Necessary bandwidth

Standard Cellular AMPS operation; 1 channel / 30 kHz carrier; using 8 channels requiring 240 kHz of total bandwidth.
For future consideration, TDMA operation at 3 voice / 30 kHz carrier (and potentially up to 6 voice / 30 kHz carrier) and CDMA operation with a variable number of users sharing 1.23 MHz of bandwidth.

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 site is the maximum available. 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 (Maximum)

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 sixteen story NT tower whose street address is 2221 Lakeside Blvd., Richardson, Texas. Both buildings have the same latitude and longitude coordinates. Initially, in the NT Tower, the RF will only be radiated within the 5th floor, at a height of 60 ft above ground level, but BNR/NT would also like to consider testing (with approval and coordination of the A & B Cellular operators to avoid interference) at a max height, inbuilding of 208' (63.40 Meters).

The Test location is on the East side of U.S. Highway 75 (a/k/a Central Expressway), north of Campbell Road in Richardson, Texas.

BNR INC.

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. Northern Telecom MTSO switch including the Intelligent Cellular Peripheral (ICP) and, potentially the Digital Signal Processor Module (DSPM) for testing TDMA applications, and the appropriate CDMA equipment as warranted.
2. One (1) Cell Site ICRM based Controller
3. Eight (8) NT Dual Mode Radio Units 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, a variety of commercially available cellular telephone handsets may be used in the test program.

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.



cc. mailed to P. 1/18 Lamb 5/12/93

Northern Telecom Inc.
P. O. Box 83888
Richardson, TX 75083-3888
Telephone: (214) 664-6738
Fax: (214) 664-3888

John G. Lamb, Jr.
Senior Counsel

May 20, 1993

Mr. H. Franklin Wright
Frequency Liaison Branch Chief
Federal Communications Commission
2025 M Street
Washington, DC 20554

RECEIVED
MAY 22 1993

FCC/OET/SED/FLB

Subject: Experimental Radio License for In-Building
MicroCell Product Development Testing/BNR Inc. and
Northern Telecom Inc., April 23rd, 1993
application for Experimental Radio License for
Station K02XEU

Dear Mr. Wright:

On April 23rd, 1993, Northern Telecom Inc. and BNR Inc. filed an Application for an Experimental Radio License to conduct microcell product development for cellular radio systems. Currently, we are conducting such experiments pursuant to a Special Temporary Authorization (STA- File Number 5-1029-EX-93; call sign K02XEU).

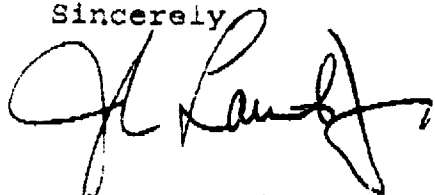
As an addendum to our application for a temporary license, I have attached a letter agreement between Northern Telecom Inc. and McCaw Cellular Communications, Inc., indicating McCaw's consent to grant such experimental authority to BNR/NTI for a six month period, subject to certain conditions. As you will note, NTI/BNR undertakes to file the letter with the FCC as an addendum to its Experimental Radio License application.

May 20, 1993

Page 2

If you have any questions concerning this matter, please contact me at the above phone number or Mel Hacker at (615) 734-4109.

Sincerely

A handwritten signature in black ink, appearing to read "J. Lamb, Jr.", with a stylized flourish at the end.

John G. Lamb, Jr.
Senior Counsel



**McCaw Cellular
Communications, Inc.**

**Cathleen A. Massey
Regulatory Counsel**

May 18, 1993

**Matt Desch
Assistant Vice President
Cellular Systems
Northern Telecom Inc.
2221 Lakeside Blvd.
Richardson, TX 75082-3871**

**RE: BNR Inc. and Northern Telecom Inc.
April 23, 1993 Application for Experimental
Radio License for Station KO2XEU**

Dear Mr. Desch:

I am an authorized representative for Metroplex Telephone Company ("Metroplex"), the Block A cellular telephone licensee for the Dallas, TX MSA. BNR and Northern Telecom Inc. ("BNR/NTI") filed on April 23, 1993 an application with the Federal Communications Commission for an experimental radio license for in-building, low-power, microcell product development in the range of spectrum exclusively reserved for cellular service. Metroplex has agreed not to oppose the application and to consent to grant of experimental authority to BNR/NTI for a six-month period under the following conditions:

1. BNR/NTI agrees to limit its tests to the following cellular channels in the 869 to 894 MHz range unless it obtains the express, prior approval of Metroplex's Manager of Engineering Dick Gilley for the use of other channels:

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

2. Upon the request of Metroplex, BNR/NTI will modify or cease using at any time those channels licensed to Metroplex.

3. BNR/NTI will cease all use of cellular channels licensed to Metroplex by November 22, 1993 unless Metroplex consents in writing to an extension of this agreement.

4. BNR/NTI will provide Dick Gilley with a copy of the BNR/NTI test plan within two weeks of the date of this letter and provide him with test results on a monthly basis.

5. A copy of this agreement will be filed by NTI/BNR with the FCC as an addendum to BNR/NTI's experimental radio license application. NTI/BNR will provide Metroplex with a date-stamped copy of the filing.

Please indicate NTI/BNR's agreement to these conditions by signing this letter and returning a copy to me at the address below.

Sincerely,

Cathleen A. Massey

Cathleen A. Massey
Metroplex Telephone Company

NORTHERN TELECOM INC.

Matthew J. Desch

By: Matthew J. Desch

Title: AVP, CONVERGE SYSTEMS

Enclosures

Copies: Dick Gilley
Mike Bamburak