national spectrum managers association

Recommendation WG 12.87.009

TRANSBORDER COORDINATION :

STANDARD FOR INTERCHANGE

of

LARGE VOLUMN MICROWAVE PATH DATA

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STANDARD
FOR
INTERCHANGE OF LARGE VOLUME MICROWAVE PATH DATA

1. INTRODUCTION

This document defines a standard format for use by organizations in North America wishing to exchange with one another microwave path data residing in their respective but differently structured databases. There are a number of organizations maintaining such databases in North America that consider this a useful or necessary operation. Each database has its own unique structure which can cause problems with the interchange of such large volume data.

At present, anyone wishing to import data from another organization's database must write a computer procedure to interpret the data and spend a large amount of time translating the various antenna, equipment, operator and loading codes from the supplier's code to the internal code used by the receiving database. One procedure must be written for each supplier of data.

2. WHAT THIS STANDARD IS NOT

This standard is not a format for the exchange of prior coordination information dealing with small changes to a site, or low volume information that can be handled at the individual query level. The impetus for this standard comes from the need to transfer large sections of one user's database to another user.

It is also not intended to be a standard or specification for the structure of any user's database, but to be convertible with minimum effort to and from most structures currently used. It is thus purely a structure for communicating the database information of one organization to the database of another.

3. THE APPROACH

It is desirable that there be one unique format for data interchange so that interchangers will know that each time they receive a set of data, it will be in the same format as the last one they received. It is assumed that each subscriber to the standard has two in-house computer procedures. One converts the subscriber's database to the standard, the other converts the standard to the subscriber's database. A subscriber might also have other utility procedures to aid in the construction of translation tables and so forth. The standard therefore consists of:

(a) A common representation of the microwave coordination data representing the site, path and channel information.

(b) A common format to represent description tables for equipment, antenna codes and so on in order to ease the task of code translation. Each subscriber is responsible for maintaining the necessary translation tables to convert to their own system.

With this operation in mind the approach taken in constructing this standard is based on the following criteria:

(a) The standard should be as common as possible to all potential users. This means that it should be as easy as possible for the various views of the data to be constructed from the standard and converted to the standard.

(b) The standard description tables should be designed so that automation in the creation of the user's translation tables should be as cost effective as possible.

(c) There is no need for data compression in the standard as it will occupy cheap storage media.

(d) The format should be "sortable" as desirable by the target user (or by the source at the target user's request). This is the easiest way to accommodate the large variety of representations that the standard must address. For this reason such data is duplicated on each record in order to give a usable sort key to the most number of users.

4. DESCRIPTION TABLES

Description tables are necessary in a standard such as this. These tables contain such information as antenna codes, equipment codes, and operator/owner codes. They must be in a form that can be easily used by the receiving organization to construct the necessary translation tables for loading the database.

Each record in a particular description table must be unique with respect to the key item. For example, there may not be two antennas with the same key item. The description tables must also be complete. That is, each key item in any path record must have been defined in the corresponding description table.

The description tables for the operators, antennas, and equipments will be exchanged via transfer media mutually agreed to by the parties involved. In addition, the recipient will require printed tables for state/province codes, load codes and status codes. These tables are not expected to change over time and may be encoded into the computer procedures used to convert the users database to and from the interchange standard.

5. THE STANDARD FORMAT

5.1 Transfer Media Format

The transfer medium and its format will be mutually agreed to by each pair of parties exchanging data.

The only constraint this standard imposes on the transfer medium format is that all alphabetic characters be in upper case, since some systems distinguish between the two cases on input.

5.2 Data Contents

The data will consist of four files. Since the format of the data in each file is different, it is likely that each file will have a different record length and blocking factor.

The order of the files is as follows:

Site Operator Descriptions

The data giving the descriptions of the site operating companies.

Antenna Descriptions

The reference data for the antennas used.

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Equipment Descriptions

The reference data for the equipment codes used.

Microwave Path Data

The data describing the path and site information.

5.3 Microwave Path Record Format

Each record represents one microwave path with information
describing the sites, antennas, equipments as well as the
transmit frequencies, loading and power on each end of the path.
The record contains two halves with each half describing one of
the two stations comprising the microwave path. There is no
ordering for the two stations thus either station can be listed
first in the record. If one or both stations use multiple
frequency bands, and/or multiple status codes, then additional
records are used to describe the communications between the
stations. Figure 1 summarizes the data items in each record and
these items are further described below. See Appendix D for
special rules applying to a path transmitting from only one
station.

The record is "formatted" (i.e. contains no machine dependent
binary, in the sense of FORTRAN formatted I/O; it should be
printable without translation). The fields are delimited by a ~.
The record contains the following for each station:

FIGURE 1

MICROWAVE PATH RECORD FORMAT   (~ delimits each field)

Station 1	Field Name	Maximum Field Length
	Call Sign	20
	Site Name	20
	Site County	30
	Province/State	2
	Latitude	10
	Longitude	11
	Coordinate System	1
	Ground Height	6
	Operating Company	17
	Transmit Antenna	12
	Transmit Ant Height	6
	Transmit Ant Feed Loss	4
	Receive Antenna	12
	Receive Ant Height	6
	Receive Ant Feed Loss	4
	Diversity Antenna	12
	Diversity Ant Height	6
	Diversity Ant Feed Loss<CR><LF>	4

FIGURE 1 (Cont.)

THE FOLLOWING ARE REPEATED:

(Frequencies are within one frequency band):

```
TRANSMIT FREQUENCY                      17
TRANSMIT POWER                           5
TRANSMIT EQUIPMENT                      10
TRANSMIT LOADING TYPE                   10
TRANSMIT LOADING                         5
CHANNEL POLARIZATION                     4
CHANNEL STATUS<CR><LF>                   1
```

Final delimiter is ** and <CR><LF>

```
Station 2   Field Name                  Maximum Field Length
            Call Sign                       20
            Site Name                       20
            Site County                     30
            Province/State                   2
            Latitude                        10
            Longitude                       11
            Coordinate System                1
            Ground Height                    6
            Operating Company               17
            Transmit Antenna                12
            Transmit Ant Height              6
            Transmit Ant Feed Loss           4
            Receive Antenna                 12
            Receive Ant Height               6
            Receive Ant Feed Loss            4
            Diversity Antenna               12
            Diversity Ant Height             6
            Diversity Ant Feed Loss          4
            Date Last Altered<CR><LF>        8

            THE FOLLOWING ARE REPEATED:

            TRANSMIT FREQUENCY              17
            TRANSMIT POWER                   5
            TRANSMIT EQUIPMENT              10
            TRANSMIT LOADING TYPE          10
            TRANSMIT LOADING                 5
            CHANNEL POLARIZATION             4
            CHANNEL STATUS<CR><LF>           1

            ** <CR><LF>
```

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5.3.1 Call Sign

Length   20 characters

This is the FCC or Industry Canada assigned station call sign. In the case where a station has not received a call sign yet, a "fictitious call sign may be assigned. A fictitious call sign is a unique series of non-blank characters starting with '?'. This designation is unique to the supplier of the data and must be maintained over subsequent exchanges.

5.3.2 Site Name

Length   20 characters

This can be anything meaningful to describe the site.

5.3.2.1 Site County

Length   30 characters

5.3.3 Site Province, State or Territory

Length   2 characters

The two character USPS abbreviation of the state or province.

5.3.4 Site Latitude

Length   10 characters

Ten character representation to the hundredths: [-|blank]ddmmss.ss, all zeros should be present explicitly, for example -490700.00. "-" indicates South latitude. A blank indicates North latitude.

5.3.5 Site Longitude

Length   11 characters

Eleven character representation to the hundredths: [-blank]dddmmss.ss, all zeros should be present explicitly, for example -0770001.00. "-" indicates West longitude. A blank indicates East longitude.

5.3.6 Coordinate System

Length   1 character

1 for North American Datum83 (NAD/83)
2 for North American Datum27 (NAD/27)

5.3.7 Site Ground Height

Length   6 characters

Height above mean sea level in metres to the nearest metre.

5.3.8 Site Operating Company Key

Length   17 characters

This is the key into the operator translation table for the company that operates the site.

5.3.9 Transmit Antenna Key   12 characters

This is the key into the antenna translation table for the transmit antenna at the station.

5.3.10 Transmit Antenna Height

Length   6 characters

The height above ground of the centerline of the transmit antenna for the station, in metres to the nearest metre.

5.3.11 Transmit Antenna Feed System Loss

Length   4 characters

This is the feed system loss in dB to 1 decimal place, for the transmit antenna.

5.3.12 Receive Antenna

Length   12 characters

Key item into the antenna translation tables for the receive antenna of the station. If a separate receive antenna is not used, that is, the transmit antenna is also used to receive, then this item will be blank.

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5.3.13 Receive Antenna Height

Length   6 characters

Height above ground in metres of the centreline of the receive antenna at the station if a separate receive antenna is used, otherwise left blank.

5.3.14 Receive Antenna Feed System Loss

Length   4 characters

Feed loss as described in 5.3.11

5.3.15 Diversity Antenna

Length   12 characters

Key item into the antenna translation tables for the diversity antenna, otherwise left blank if not used.

5.3.16 Diversity Antenna Height

Length   6 characters

Height above ground in metres of the diversity antenna. Left blank, if no diversity antenna.

5.3.17 Diversity Antenna Feed System Loss

Length   4 characters

Antenna feed system loss as described in 5.3.11. Left blank if the diversity antenna is not identified.

5.3.18 Date Last Altered

Length   8 characters

The date the record was last altered. It is stored in International Standard Form (YYYYMMDD). This is an optional field and if not available should be left blank. This field is only entered for Station #2.

THE FOLLOWING FIELDS, 5.3.19 - 5.3.25 ARE REPEATING:

5.3.19 Transmit Frequency

Length   17 characters

Frequency in MHz to thousandths (e.g.: NNNNN.NNN).

5.3.20 Transmit Power

Length   5 characters

The output of the transmission equipment in dBm to 1 decimal point. For example 40.0 represents 40 dBm.

5.3.21 Transmit Equipment

Length   10 characters

This is the key into the equipment translation table for the equipment used at the transmitting end. Left blank if the frequency plan is not identified.

5.3.22 Transmit Loading Type

Length   10 characters

This is the key item into the loading translation table. See Appendix C for list under Modulation Type.

5.3.23 Transmit Loading

Length   5 characters

- Number of 4KHz voice channels if Analog System.
- Number of Mbps to 1 decimal place if Digital system.
- Peak deviation in MHz to 1 decimal place if Video system.

5.3.24 Channel Polarization

Length   4 characters

The valid polarizations and their meanings are listed in Appendix A.

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5.3.25 Channel Status

Length   1 character

The valid channel status characters and their meanings are listed in Appendix B.

5.4 Operator Record Format

This section of the media contains the codes and interpretations for the operating companies referred to by the path records.

5.4.1 Operating Company Key

Length   17 characters

This is the key used to refer to the operating company for each site. It may be any seventeen alphanumeric characters.

5.4.2 Operating Company Name

Length   40 characters

The name of the operating company or institution.

5.4.3 Operating Company Address

Length   50 characters

The street address of the company or institution.

5.4.4 Operating Company City

Length   20 characters

The city of the company or institution.

5.4.5 Operating Company State, Province or Territory

Length   2 characters

The USPS code for the jurisdiction.

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5.4.6 Operating Company Zip

Length   10 characters

The postal code for the operating company; alphanumeric.

5.4.7 Operating Company Coordination Contact

Length   40 characters

The name of the person or department to make contact with for coordination purposes.

5.4.8 OPERATING COMPANY PHONE NUMBER

Length   16 characters

The telephone number including area code in the form 9999999999.

5.4.9 OPERATING COMPANY IDENTIFICATION NUMBER

Length   17 characters

This is an optional field that can be used to contain the FCC or Industry Canada designated number referring to the operating company (e.g. NN-NNNNNNN).

5.4.10 Protection Company Key

Length   17 characters

This is the key used to refer to the protection company for each site. It may be any seventeen alphanumeric characters.

5.5 Antenna Description Record Format

This section of the media contains the description of the antennas used in the first section. The fields are delimited by a ~.

5.5.1 Antenna Key

Length   12 characters

This is the twelve alphanumeric character key used in the originating organization's microwave path records to refer to an antenna.

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5.5.2 Antenna Manufacturer

Length   40 characters

The name of the company that manufactured the antenna.

5.5.3 Antenna Catalogue Number

Length   20 characters

This is the number of this antenna in the manufacturer's catalogue. If this is not a relevant description, it is the code most commonly used to unequivocally refer to the antenna.

5.5.3.1 Antenna Feed Orientation

Length   1 character

L, R or blank to designate left or right hand orientation.

5.5.4 Antenna FCC/NSMA Designation

Length   10 characters

In cases where the antenna has an FCC designation this field will contain the FCC designation. Otherwise it will contain the NSMA designation. This field appears in order to ease the process of translation and allow some automation of the process.

5.5.5 Antenna Gain

Length   6 characters

The gain of the antenna in dBi to 1 decimal place (e.g. NN.N).

5.5.6 Freq Lower Limit

Length   17 characters

The lower limit in MHz of the transmit frequency range as a whole number.

5.5.7 Freq Upper Limit

Length   17 characters

The upper limit in MHz of the transmit frequency range as a whole number.

5.6 Equipment Description Record Format

This section of the media contains the descriptions of the equipment codes used in the microwave path records.   The fields are delimited by a ~ and contain the following:

5.6.1 Equipment Key

Length   10 characters

This is the ten character alphanumeric key used by the originating organization in the first section to refer to this equipment type.

5.6.2 Equipment Manufacturer

Length   40 characters

This is the manufacturer of the equipment.

5.6.3 Manufacturer's Catalogue Number

Length   20 characters

The code used in the manufacturer's catalogue to identify this equipment type.   If this is not relevant, then this is the code most commonly used to unambiguously refer to this equipment type.

5.6.4 FCC Equipment Designation

Length   10 characters

This is the FCC designation of this equipment type, if available, otherwise left blank.

5.6.5 Equipment Stability

Length   8 characters

This is the equipment stability in percent of the carrier frequency, with the decimal point. This data must always be present.

5.6.6 Emission Designator

Length   9 characters

The emission designator consists of 4 characters representing bandwidth, and 5 characters representing emission characteristics.

APPENDIX A - CHANNEL POLARIZATION CHARACTERS

The channel polarization is four characters, as follows:

H	-	Horizontal
V	-	Vertical
D	-	Both Horizontal and Vertical
CR	-	Right Circular Polarization
CL	-	Left Circular Polarization
?	-	Unknown Polarization
SR	-	Linear Polarization, rotated 45° clockwise, by right hand rule, from vertical
SL	-	Linear Polarization, rotated 45° counter-clockwise, by right hand rule, from vertical
M	-	Mixed Polarization
L999	-	Linear Polarization, Rotated 1° to 359° from a line parallel to the equatorial plane

APPENDIX B - CHANNEL STATUS CHARACTERS

The channel status is a one character code to indicate its operational status.

G	-	Planned Growth Frequency
U	-	Prior-coordinated
O	-	Operational
R	-	Removed from Operation This could be used to detect channels to be deleted from the database
?	-	Status is unknown, but frequency is present
T	-	Temporary
L	-	Applied for License
C	-	Building Permit Granted

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APPENDIX C - CHANNEL LOADINGS

Loading Type (Modulation)   Transmit Loading
(10 characters)   (5 characters)

FDMFM	Frequency Division Multiplex FM	Number of Voice Freq. channels
FDMSSB	Frequency Division Multiplex SSB	Number of Voice Freq. channels
VIDFM	Video FM	Peak Deviation in Mhz to 1 decimal place
VIDSSB	Video SSB	Peak Deviation in Mhz to 1 decimal place
VIDEO	Video, general	Peak deviation to 1 decimal place
DUV	Digits Under Voice	Number of Voice Freq. channels
DAV	Digits Above Voice	Number of Voice Freq. channels
ANALOG	Analog, general	Number of Voice Freq. channels

For Digital Systems:

FSK	Frequency Shift Keying	Bit rate in Mbits/s
ASK	Amplitude Shift Keying	to 1 decimal place,
PSK	Phase Shift Keying	for all loading types.
MSK	Minimum Shift Keying	
DMSK	Dual MSK	
QPSK	Quadrature Phase Shift Keying	
8PSK	8 Level PSK	
16PSK	16 Level PSK	
4QAM	4 Level Quadrature Amplitude Modulation	
8QAM	8 Level QAM	
16QAM	16 Level QAM	
32QAM	32 Level QAM	
64QAM	64 Level QAM	
128QAM	128 Level QAM	
256QAM	256 Level QAM	
512QAM	512 Level QAM	
QPRS3	Quadrature Partial Response System, Level 3	
QPRS7	QPRS Level 7	
QPRS9	QPRS Level 9	
QPRS25	QPRS Level 25	
QPRS49	QPRS Level 49	
DIGITAL	Digital, general	

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APPENDIX D - DESCRIBING ONE WAY PATHS

If a microwave path is transmitting from only one station then the following rules apply.

DATA ITEM	TRANSMIT SIDE	RECEIVE SIDE
Transmit Antenna Information	Supplied	Blank
Receive Antenna Information	Blank	Supplied
Diversity Antenna Information	Blank	Optional
Power, Equipment, Stability, Loading	Supplied	Blank
Frequency, Polarization, Status	Supplied	Blank