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# Antenna Data Exchange File Format (ADX)

**Technical Reference**

**Version 1.2**

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# Antenna Data Exchange (ADX) File Format

## Technical Reference

### Version 1.2

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26 March 09	1.1	Change MERCS References to MCF RF Safety Compliance Program	Tony Paul
19 May 2009	1.2	Additional Fields update	Vadim Zaitchik

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## Introduction

The Mobile Carriers Forum (MCF) is an industry group comprising the four mobile phone carriers in Australia: Hutchison, Optus, Telstra and Vodafone.

The MCF's agenda is to deal specifically with social and environmental issues within the policy, regulatory and operational environment associated with the deployment and operation of mobile phone networks. While the MCF does not deal in site specific issues, it will strive to ensure that the mobile carrier's industry as a whole, addresses community and Government expectations.

The 4 key functions of the MCF are:

1. Coordination in deployment and network operations and cooperation with Stakeholders;
2. Enhanced communication, education and consultation;
3. Mobile carrier industry liaison with Government and other industry stakeholders;
4. And research and development of best practice in deployment and network operations.

## 2 Glossary of Terms

- ADX – The MCF Antenna Data Exchange format
- Antenna Pattern – the graphical representation of directional field strength of radiation from an antenna
- ARPANSA – Australian Radiation Protection and Nuclear Safety Agency
- Bearing – Horizontal orientation of an antenna from True North (in degrees)
- CANRAD - Telstra In-house Radio System Database
- Eagle – Telstra In-house Radio Planning Software
- Electrical Tilt – Alignment of an antenna pattern from vertical (in degrees)
- EME – Electromagnetic Emissions
- Gatekeeper – MCF Representative to control Antenna Data input into the NAD
- Height – Height at the Antenna midpoint from a ground reference
- ICNIRP – International Commission on Non-Ionising Radiation Protection
- MCF – Mobile Carriers Forum part of Australian Mobile Telecommunications Association
- Mechanical Tilt – Physical alignment of an antenna from vertical (in degrees)
- MERCs – MCF EME Regulatory Compliance Strategy now known as the MCF RF Safety Compliance Program
- NAD – National Antenna Database
- NSA – National Site Archive for MCF Carrier sites
- Planet – Radio Planning Software antenna pattern format
- radPro – Corearth EME Modelling software

- RF Map – Telstra Environmental EME Assessment software
- RSO – Radio Service Operator
- SDX – The MCF Site Data Exchange format
- STAD – Site Transmitter Antenna Data
- XML - Extensible Markup Language. A general-purpose specification for creating custom markup languages.

### 3 What is the MCF RF Safety Compliance Program?

The MCF RF Safety Compliance Program (formerly known as MERCS) is a compliance strategy developed by the mobile carriers to meet the regulatory requirements of:

- ACMA
- Radiocommunications Licence Conditions
- OH&S Legislation

The RF Safety Compliance Program (RFSCP) enables the management of cumulative site EME in line with the requirements of ARPANSA Radiation Protection Standard (RPS) No. 3 (Compliant with International ICNIRP Standard).

The RFSCP Processes involve a set of Key Components for management of EME compliance

- National Site Archive for all Sites
- National Antenna Data Base – providing an antenna pattern base line for site RF assessments
- NATA Pre qualified Independent RF Assessors
- Standard EME Site Safety Documents
- Standard Site Signage and a proportioned cost recovery structure

It is important to understand that the RF Safety Compliance Program is not a body or organisation. It represents a mechanism to demonstrate compliance and therefore it is available to Carriers and other Radio Service Operators (RSO). The processes and systems are the intellectual property of the Mobile Carriers and the overall system is managed by the MCF.

### 4 A National Antenna Database

The MCF is developing a National Antenna Database (the NAD) as part of the overall MCF RF Safety Compliance Program (formerly MERCS). The NAD is a centralised database that houses Carrier/Radio Service Operator and third party antennas data that has been either supplied by the manufacturer and/or has been quality assured.

The role of the MCF RF Safety Compliance Program is to address the key issues in the deployment of mobile telephone infrastructure. This is achieved through the development and adoption of the principals set out in the ACIF Code for Deployment of Mobile Telephone Infrastructure and EME Compliance in the program.

The NAD development project seeks to remove unnecessary duplication for RF Assessors creating and maintaining their own database of antenna patterns and to set an industry baseline for data consistency. This approach will simplify the data management required to show regulatory compliance and will facilitate the update of existing assessments through an open source format that is independent of any particular site assessment software package.

## 5 Antenna Data Exchange Format (ADX)

The NAD is intended to be a database of antenna patterns commonly used by the Carriers and RF Safety Compliance Program participants. The MCF has developed a specification for this XML scheme known as the Antenna Data Exchange Format (ADX). This document details the structure and content of the ADX for all users of MCF Antenna pattern data.

This format will be publicly available for download on the MCF Website at [www.mcf.amta.org.au](http://www.mcf.amta.org.au).

An additional format for Site Data for use with the RFNSA and known as the Site Data Exchange Format (SDX) will also be freely available on the MCF website.

## 6 Purpose

This specification is intended to define an interoperable XML Antenna Data Exchange (ADX) format. MCF is committed to ensuring the interoperability of the ADX file format through publication and maintenance of this specification. We envision that all ADX compatible vendors and EME software developers will adopt and benefit from this format and will share and support MCF's commitment to Antenna Data interoperability.

## 7 Intended audience

This specification is intended for use by developers of EME software to enable Antenna Data Exchange between different EME assessment products.

## 8 Scope

The specification specifies Antenna Data Exchange (ADX) XML file format.

## 9 ADX intended usage

The ADX file format will enable consistent exchange of antenna pattern data between different EME software applications and systems..

The NAD will be maintained up to date with the latest antenna data available from the antenna manufactures and other sources. These updates will be made available for download from the RFNSA website in ADX format.

The ADX format is an XML file designed to provide an open source file transfer protocol intended to allow an effective interface between various commercially

available Software based EME assessment engines and the National Antenna pattern Database (The NAD).

This technical reference document specifies the ADX format such that individual users (or providers) of an EME assessment software product can build software converters that accept the NAD in the form of a single XML file. The NAD file should be formatted to the ADX specification for the converter to construct an antenna pattern database suited to the EME assessment software package. Alternately an imbedded interface within the EME assessment software product could accept the ADX file format directly.

The ADX format NAD file will be available on the RFNSA for download.

A single NAD and associated ADX inter-exchange format should provide uniform Antenna Pattern data sets for use within the RF Safety Compliance Program EME assessment processes independent of EME assessment engine or product employed. An MCF appointed antenna pattern Gatekeeper will undertake all pattern data verification and entry tasks and subsequent ADX format file upload to the RFNSA.

## 10 XML Structure

### 10.1 Object Relationship Diagrams

The relationship between top level elements in the ADX file is shown in the Figure 3. Figure 1 and Figure 2 show the sub element relationship for Antenna and Pattern elements respectively.

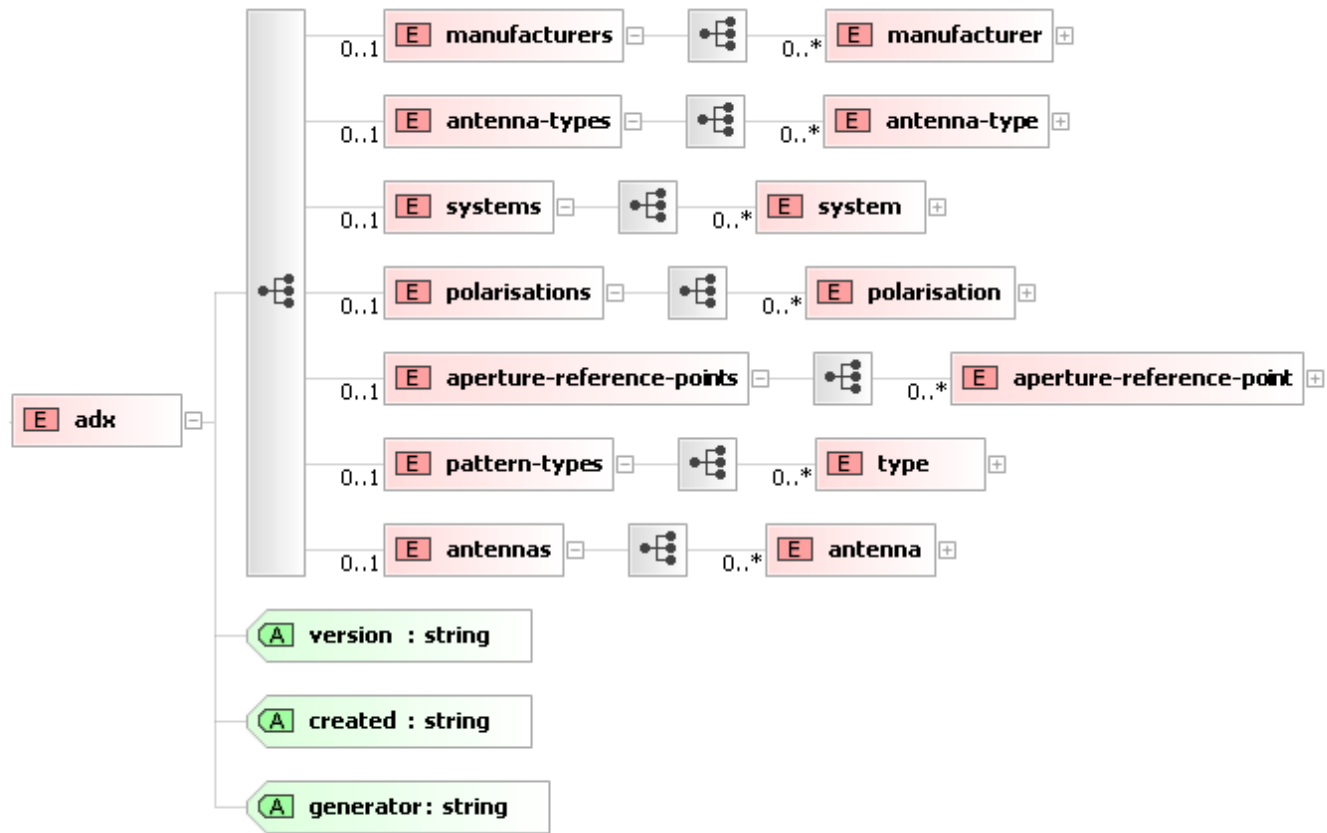


Figure 3



Figure 4

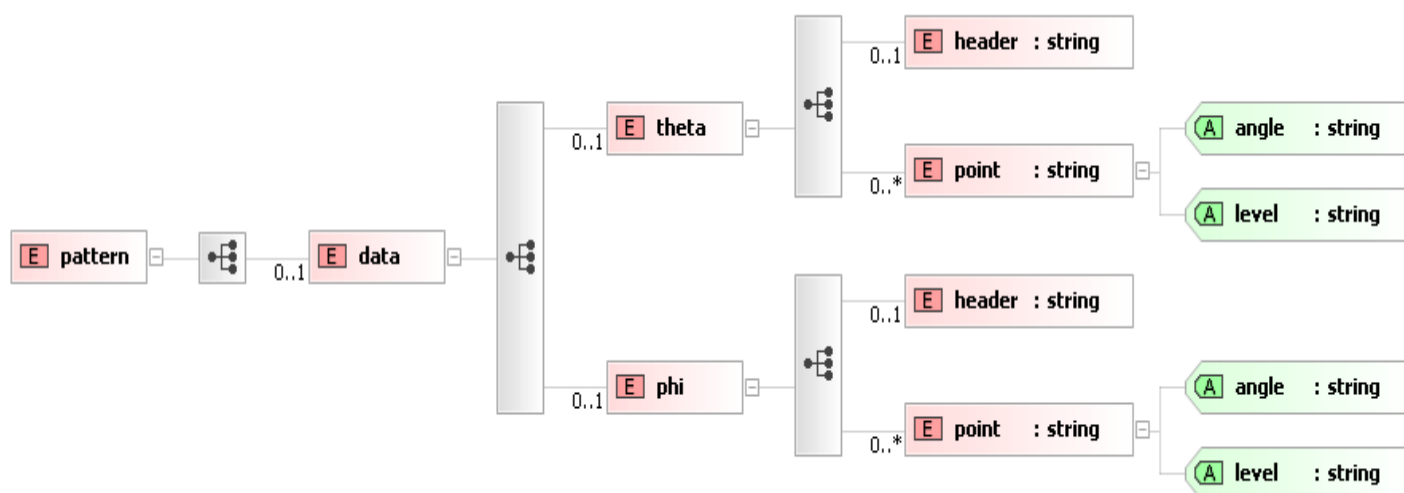


Figure 5

## 10.2 Elements of the ADX

### ADX

**Element Name:** adx

**Description:** Root element containing all the antenna and supplementing data

**Attributes:**

Name	Description
version	ADX specification version used to generate xml file
created	Date xml file was generated
generator	Name of the Application used to generate ADX file

**Child elements:**

Name	Description
manufactures	Manufacturers referenced in the data
antenna-types	Antenna types referenced in the data
polarisations	Polarisations referenced in the data
aperture-reference-points	Aperture Reference Points referenced in the data
pattern-types	Pattern Types referenced in the data
antennas	Antennas

### Manufacturer

**Element Name:** manufacturer

**Description:** Manufacturer data

**Attributes:**

Name	Description
Id	Manufacturer unique identifier

**Child elements:**

Name	Description
name	Manufacture Name
contact-name	Manufacture contact name
phone-no	Manufacture Phone number
fax-no	Manufacture Fax number
address1	Manufacture Address
address2	Manufacture Address
address3	Manufacture Address
state	Manufacture Address
postcode	Manufacture Address
country	Manufacture Address

**Antenna Type****Element Name:** antenna-type**Description:** Antenna type data**Attributes:**

Name	Description
id	Antenna type unique identifier

**Child elements:**

Name	Description
aperture-reference-point-id	Id of a Aperture Reference Point for this type
name	Antenna Type name
description	Antenna Type description

**Polarisation****Element Name:** polarisation**Description:** Polarisation data**Attributes:**

Name	Description
id	Polarisation unique identifier

**Child elements:**

Name	Description
------	-------------

name	Polarisation name
description	Polarisation description

### Aperture Reference Point

**Element Name:** aperture-reference-point

**Description:** Aperture Reference Point

#### Attributes:

Name	Description
id	Aperture Reference Point unique identifier

#### Child elements:

Name	Description
name	Aperture Reference Point name
description	Aperture Reference Point description
position	Mnemonic representation of aperture reference point position

### Pattern Type

**Element Name:** type

**Description:** Pattern Type

#### Attributes:

Name	Description
id	Pattern Type unique identifier

#### Child elements:

Name	Description
name	Pattern Type name
description	Pattern Type description

### Antenna

**Element Name:** antenna

**Description:** Antenna data

#### Attributes:

Name	Description
id	Antenna unique identifier
created	Date Antenna was created
modified	Date Antenna was modified

#### Child elements:

Name	Description
model-no	Antenna model number

description	Antenna description
regulator-no	Government regulators number for the antenna
type	Antenna Type
width	Width of antenna in millimetres
height	Height of antenna in millimetres
depth	Depth of antenna in millimetres
third-party-ids	Third party ids
ports	Antenna Ports
patterns	Antenna Patterns
aliases	Antenna Aliases

### Third-party

**Element Name:** third-party

**Description:** Third party id entry

**Attributes:**

Name	Description
data-provider-name	Name of the data provider
data-id	Id used by data provider

### Port

**Element Name:** port

**Description:** Antenna Port data

**Attributes:**

Name	Description
id	Port unique identifier

**Child elements:**

Name	Description
port-no	Number indicating antenna port number. Ports should be sequentially numbered
description	Port description
segments	Port segments

### Segment

**Element Name:** segment

**Description:** An electrical segment of an antenna that can act as a receive or transmit component within the antenna body.

**Attributes:**

Name	Description
------	-------------

id	Segment unique identifier
----	---------------------------

**Child elements:**

Name	Description
segment-no	Segment number
gain-dbi	Manufacturer catalogue gain for the segment in dBi, not dBd.
min-freq	Segment minimum frequency in MHz
max-freq	Segment maximum frequency in MHz
min-edt	Segment minimum electrical downtilt in degrees
max-edt	Segment maximum electrical downtilt in degrees
aperture-size	Segment aperture size in millimetres
width	Segment width in millimetres
height	Segment height in millimetres
depth	Segment depth in millimetres
use-offsets	A flag specifying if valid x, y and z offsets are entered
xoffset	Segment X Offset from antenna reference position in millimetres. Offset is always to centre of segment.
yoffset	Segment Y Offset from antenna reference position in millimetres. Offset is always to centre of segment.
zoffset	Segment Z Offset from antenna reference position in millimetres. Offset is always to centre of segment.

**Pattern****Element Name:** pattern**Description:** Antenna Pattern data**Attributes:**

Name	Description
id	Pattern unique identifier

**Child elements:**

Name	Description
pattern-type-uid	Pattern Type unique identifier
description	Description of pattern
serial-no	Serial number of antenna used to measure radiation pattern
gain-dbi	Gain of antenna in dBi at its peak response for the frequency used in pattern measurement.
edt-min	Minimum electrical downtilt if this pattern is an

	envelope pattern OR if normal pattern then just the EDT for this pattern.
edt-max	Maximum EDT if this is an envelope pattern OR if normal pattern then should be 0.
assessment-frequency	A recommended Frequency in MHz for assessments
frequency	Frequency in MHz at which the pattern was measured
polarisation	Polarisation unique identifier.
source	Source of antenna pattern data.
third-party-ids	Third party ids
data	Theta and Phi data elements

### Theta data

**Element Name:** theta

**Description:** Antenna Pattern Theta data

### Phi data

**Element Name:** phi

**Description:** Antenna Pattern Phi data

### Data Point

**Element Name:** point

**Description:** Antenna Pattern data point

## 11 XML Schema

### XML Schema file

```

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