



RadioDNS Developers Group

2014-05-15

Circulation of FINAL DRAFT Documents for Comment

RadioDNS Hybrid Radio Lookup

This document is the proposed ETSI standardisation of the RadioDNS Hybrid Radio Lookup, and is circulated for your information and comments.

1. Specifies how to construct RadioDNS FQDN and ServiceIdentifier from broadcast parameters for FM, DAB, DAB+ and HD Radio
2. Specifies how to use DNS lookup on radiodns.org to retrieve the Authoritative FQDN
3. Specifies how to find the Authoritative FQDN/ServiceIdentifier from EPG SI
4. Specifies how to find the Authoritative FQDN/ServiceIdentifier from IP audio streams
5. Specifies how to calculate GCC (Global Country Code) from Geo-information if ECC can't be received

Please email your comments / changes to radiodns-developers@googlegroups.com, including the page number / section reference.

draft **TS 1xx xxx** V1.1.1 (2014-05)



**RadioDNS Hybrid Radio;
Hybrid lookup for radio services**

Reference

JTC-DTS-028

Keywords

BROADCASTING, DNS, IP, RADIO

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute yyyy.

© European Broadcasting Union yyyy.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Contents.....	3
Intellectual Property Rights.....	4
Foreword	4
1 Scope.....	5
2 References.....	5
2.1 Normative references.....	5
3 Definitions and abbreviations	6
3.1 Definitions	6
3.2 Abbreviations.....	6
4 Introduction.....	7
5 Authoritative FQDN resolution and ServiceIdentifier construction for broadcast services	8
5.1 RadioDNS FQDN and Service Identifier construction	8
5.1.1 FM with RDS/RBDS	8
5.1.1.1 Construction of RadioDNS FQDN	8
5.1.1.2 Construction of ServiceIdentifier.....	8
5.1.2 Digital Audio Broadcasting (DAB/DAB+).....	9
5.1.2.1	Construction of RadioDNS FQDN 9
5.1.2.2. Construction of ServiceIdentifier	9
5.1.3 Digital Radio Mondiale (DRM) and AM Signalling System (AMSS).....	10
5.1.3.1	Construction of RadioDNS FQDN 10
5.1.3.2	Construction of ServiceIdentifier 10
5.1.4 IBOC	10
5.1.4.1	RadioDNS FQDN Construction 11
5.1.4.2	RadioDNS ServiceIdentifier Construction 11
5.2 Resolution of Authoritative FQDN	11
6 Authoritative FQDN and ServiceIdentifier resolution for IP-streamed services	11
6.1 Inclusion of parameters into stream metadata	12
6.1.1 Streaming transports	12
6.1.1.1 ICY (also known as SHOUTcast)	12
6.1.1.2 ASF.....	12
6.1.1.3 Flash Audio	13
6.1.2 Metadata intervals.....	13
7 Authoritative FQDN and ServiceIdentifier resolution from EPG SI.....	13
8 Implementation requirements	13
8.1 Service provider implementation.....	13
8.2 Device Implementation.....	14
Annex A (normative); Deriving the GCC for a service	15
A.1 Deriving the GCC using ECC	15
A.2 Deriving the GCC without ECC.....	15
History.....	25

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE 1: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

European Broadcasting Union
CH-1218 GRAND SACONNEX (Geneva)
Switzerland
Tel: +41 22 717 21 11
Fax: +41 22 717 24 81

The RadioDNS Project was established in 2010 to standardise the combination of broadcast radio systems with additional applications, content and meta-data delivered over fixed or mobile IP networks. The project produced a specification using DNS to locate the broadcaster's Internet domain which is in use worldwide, and now standardised as XX XXX XXX. RadioDNS operates the authoritative name servers for the radiodns.org domain, and has members drawn from broadcasting organisations, manufacturers and service providers.

NOTE 2: "RadioDNS Hybrid Radio" and the RadioDNS Hybrid Radio logo are registered trademarks of RadioDNS Limited, a not-for-profit company owned by its members

1 Scope

The present document defines the methodology for discovering an Authoritative FQDN for a radio service, including discovery using DNS queries to radiodns.org, a root domain name server operated by RadioDNS. The present document also defines the construction of a unique ServiceIdentifier parameter for a radio service.

NOTE: Specifications for applications built upon the RadioDNS methodology can be found at <http://radiodns.org/docs>.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 300 401: "Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers"
- [2] ETSI ES 201 980: "Digital Radio Mondiale (DRM); System Specification"
- [3] ETSI TS 102 386: "Digital Radio Mondiale (DRM); AM signalling system (AMSS)"
- [4] NRSC-5-B:2008: "In-band/on-channel Digital Radio Broadcasting Standard"
- [5] ETSI TS 102 818: "EPG Definition for Radio Services"
- [6] RFC 1035 (1987): "Domain Names – Implementation and Specification"
- [7] RFC 3761 (2004): "The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)"
- [8] IEC 62106:2009: "Specification of the Radio Data System (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 MHz to 108,0 MHz"
- [9] NRSC-4-A: "Specification of the radio broadcast datatransmission system (RBDS)"
- [10] ISO 3166-1: "Codes for the representation of names of countries and their subdivisions – Part 1: Country codes"
- [11] RFC 2782 (2000): "A DNS RR for specifying the location of services (DNS SRV)"
- [12] ICY protocol specification: <http://forums.radiotoolbox.com/viewtopic.php?t=74>
- [13] Advanced Systems Format (ASF) Specification (01.20.06 January 2012), Microsoft Corporation.
- [14] Flash Audio: http://en.wikipedia.org/wiki/Adobe_Flash#Flash_Audio
- [15] Flash Remote Shared Objects:
http://help.adobe.com/en_US/FlashPlatform/reference/actionsript/3/flash/net/SharedObject.html

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Authoritative FQDN: an internet domain for a service provider

bearer: a method of carriage of the radio service

char: a single character

hexadecimal: a representation of a number in base-16 using the characters 0-9, a-f

nibble: a four-bit aggregation, or half an octet

RadioDNS FQDN: an internet domain constructed only for the purposes of querying DNS

service: a radio station or data service

service provider: an organisation providing RadioDNS Hybrid Radio applications

ServiceIdentifier: a string that uniquely identifies a radio service within the scope of an Authoritative FQDN

string: zero or more characters in the range 0-9, a-z

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AMSS	Amplitude Modulation Signalling System
CNAME	DNS Canonical Name record
DAB	Digital Audio Broadcasting
DNS	Domain Name System
DRM	Digital Radio Mondiale
ECC	Extended Country Code
FCC	Federal Communications Commission
FM	Frequency Modulation
FQDN	Fully Qualified Domain Name
IP	Internet Protocol
NS	Name Server
ODA	RDS Open Data Applications
RBDS	Radio Broadcast Data System
RDS	Radio Data System
SRV	DNS Service record
SIId	Service Identifier
VHF	Very High Frequency

4 Introduction

It is possible to supplement uni-directional radio services with applications that can take advantage of bi-directional communication using the IP protocol. These applications may enhance the radio services with which they are associated with additional content or functionality, or enable interactivity.

Radio devices should be aware of what IP delivered applications are available for each radio service it receives. Standardising the methodology to locate these applications allows a manufacturer to support IP delivered applications directly on the device.

This document standardises the methodology for locating the Authoritative Fully Qualified Domain Name (FQDN) for radio services using the following radio systems: FM with RDS[8] or RBDS[9], DAB/DAB+ [1], Digital Radio Mondiale [2], AM with AMSS [3], and IBOC [4].

The present document standardises a methodology to locate applications based upon the existing DNS methodology [6]. A RadioDNS FQDN is created from known broadcast parameters, and DNS is used to resolve this RadioDNS FQDN to a CNAME record containing the Authoritative FQDN for the service provider.

The basis for this methodology broadly follows that used to map E.164 format telephone numbers to domains [7].

This document also standardises how to locate the Authoritative FQDN without the use of DNS lookup.

The Authoritative FQDN for a Service can be acquired through a series of processes, shown in figure 1.

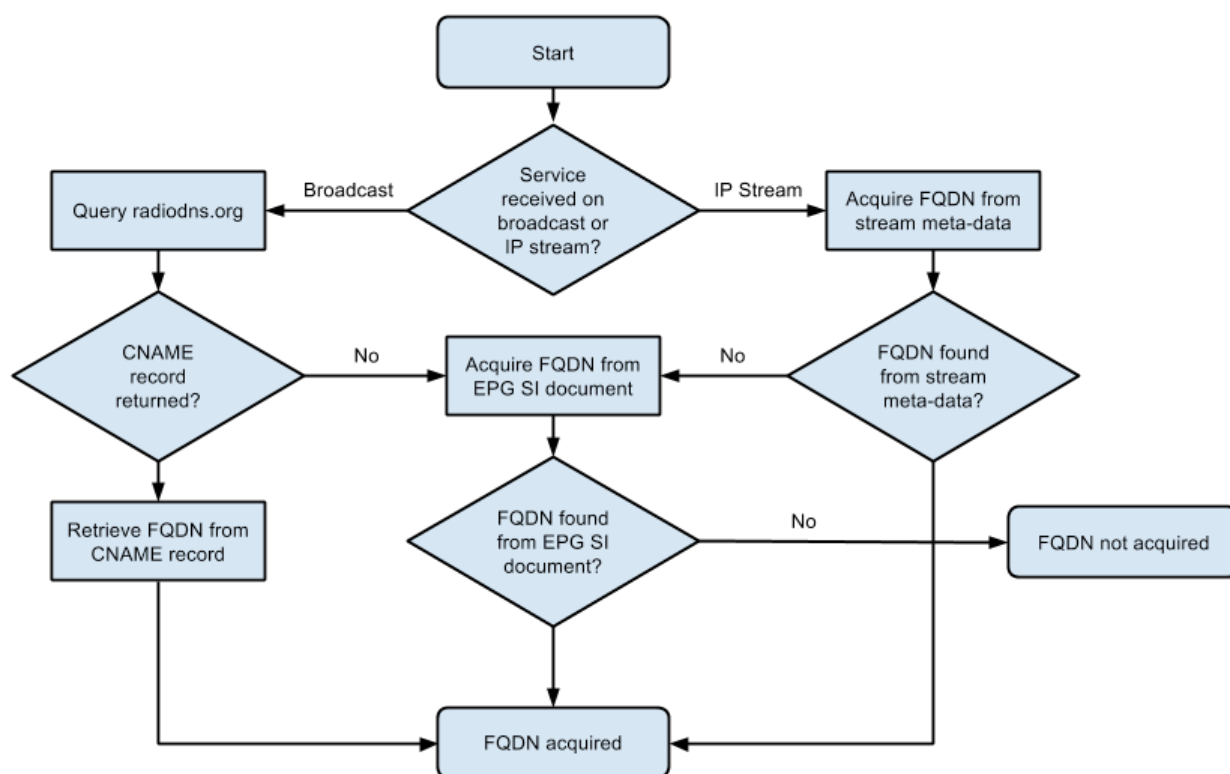


Figure 1: Process to acquire Authoritative FQDN for a service

The Service is also given a ServiceIdentifier parameter, which is unique within the scope of an Authoritative FQDN.

Clause 5 describes how to acquire the Authoritative FQDN and construct the ServiceIdentifier from broadcast radio services.

Clause 6 describes how to acquire the Authoritative FQDN and ServiceIdentifier from streaming radio services.

Clause 7 describes how to acquire the Authoritative FQDN and ServiceIdentifier from an EPG SI document.

5 Authoritative FQDN resolution and ServiceIdentifier construction for broadcast services

5.1 RadioDNS FQDN and Service Identifier construction

The construction of the RadioDNS FQDN is dependent on the bearer.

5.1.1 FM with RDS/RBDS

The FM system supports identification of a radio service through transmission of meta-data by using RDS [8] or RBDS [9].

The parameters are defined in table 1.

Table 1: RDS/RBDS parameter description

Parameter	Description	Value	Status
gcc	The Global Country Code (GCC) of the country of origin of the service (see annex A).	3-char hexadecimal	mandatory
pi	Received RDS/RBDS Programme Identification (PI) code.	4-char hexadecimal	mandatory
frequency	Frequency on which the service broadcast is received, formatted to 5 characters in units of 100 KHz. Frequencies below 100 MHz shall be supplied with a leading zero, for example 95.8 MHz would be represented as 09580, 104.9 MHz as 10490.	5-char string	mandatory

NOTE: During the development of RadioDNS, it was permitted to compile the RadioDNS FQDN using the ISO 3611 alpha-2 country code as an alternative to the GCC. However, since the GCC can be derived from location information and the PI code, only the GCC has been standardised.

5.1.1.1 Construction of RadioDNS FQDN

The RadioDNS FQDN for a VHF/FM service is compiled as follows:

```
<frequency>.<pi>.<gcc>.fm.radiodns.org
```

Some examples of RadioDNS FQDNs constructed from broadcast parameters are shown in table 2a.

Table 2a: Example of RadioDNS FQDN construction for RDS/RBDS

GCC	PI	Frequency (kHz)	RadioDNS FQDN
ce1	c586	95.8	09580.c586.ce1.fm.radiodns.org
de0	d1e0	103.9	10390.d1e0.de0.fm.radiodns.org

5.1.1.2 Construction of ServiceIdentifier

The ServiceIdentifier for a VHF/FM service is compiled as follows:

```
fm<separator><gcc><separator><pi><separator><frequency>
```

The <separator> element is application specific.

Some examples of ServiceIdentifiers constructed using a '/' as the <separator> element are shown in table 2b.

Table 2b: Example of RadioDNS FQDN construction for RDS/RBDS

GCC	PI	Frequency (kHz)	RadioDNS ServiceIdentifier (/ as separator element)
ce1	c586	95.8	fm/ce1/c586/09580
de0	d1e0	103.9	fm/de0/d1e0/10390

5.1.2 Digital Audio Broadcasting (DAB/DAB+)

The parameters used to create the RadioDNS FQDN and ServiceIdentifier are defined in table 3.

Table 3: DAB parameter description

Parameters	Description	Value	Status
gcc	The Global Country Code (GCC) of the country of origin of the service (see annex A)	3-char hexadecimal	mandatory
eid	The Ensemble Identifier (Eid) of the service	4-char hexadecimal	mandatory
sid	The Service Identifier (Sid) of the service	4- or 8-char hexadecimal	mandatory
scids	The Service Component Identifier within the Service (SCIdS) of the service component	1-char hexadecimal	mandatory
uatype	The User Application Type (UATYPE) of the data component	3-char hexadecimal	mandatory for data components, otherwise omitted

For data services (or data components of audio services) the **uatype** parameter is also mandatory.

5.1.2.1 Construction of RadioDNS FQDN

The RadioDNS FQDN construction for a DAB/DAB+ service is compiled as follows:

```
[<uatype>.<scids>.<sid>.<eid>.<gcc>].dab.radiodns.org
```

Some examples of RadioDNS FQDNs constructed from broadcast parameters are shown in table 4a.

Table 4a: Example of RadioDNS FQDN construction for DAB

GCC	Eid	Sid	SCIdS	RadioDNS FQDN
de0	100c	d220	0	0.d220.100c.de0.dab.radiodns.org
ce1	c18c	cc86	0	0.cc86.c18c.ce1.dab.radiodns.org
ce1	c185	e1c00098	0	004.0.e1c00098.c185.ce1.dab.radiodns.org

5.1.2.2 Construction of ServiceIdentifier

The ServiceIdentifier for a DAB/DAB+ service is compiled as follows:

```
dab<separator><gcc><separator><eid><separator><sid><separator><scids>[<separator><uatype>]
```

The <separator> element is application specific. The inclusion of <uatype> is mandatory for data services or data component of audio services.

Some examples of ServiceIdentifiers constructed constructed using a '/' as the <separator> element are shown in table 4b.

Table 4b: Example of RadioDNS FQDN construction for DAB

GCC	EId	SId	SCIdS	RadioDNS Service Identifier (/ as separator element)
de0	100c	d220	0	dab/de0/100c/d220/0
ce1	c18c	cc86	0	dab/ce1/c18c/cc86/0
ce1	c185	e1c00098	0	dab/ce1/c185/e1c00098/0

5.1.3 Digital Radio Mondiale (DRM) and AM Signalling System (AMSS)

The parameters used to create the RadioDNS FQDN and ServiceIdentifier are defined in table 5

Table 5: DRM / AMSS parameter description

Parameters	Description	Value	Status
sid	The Service Identifier (SId) of the service	6-char hexadecimal	mandatory

The SId value for DRM and AMSS are intended to be suitably unique internationally so as to not require region identification.

5.1.3.1 Construction of RadioDNS FQDN

The RadioDNS FQDN construction for a Digital Radio Mondiale service [2] or AM service with AMSS [3] is compiled as follows:

```
<sid>.(drm|amss).radiodns.org
```

5.1.3.2 Construction of ServiceIdentifier

The ServiceIdentifier construction for a Digital Radio Mondiale service [2] or AM service with AMSS [3] is compiled as follows:

```
(drm|amss)<separator><sid>
```

5.1.4 IBOC

The parameters use to create the RadioDNS FQDN and Service Identifier are defined in table 6.

Table 6: IBOC parameter description

Parameters	Description	Value	Status
tx	Transmitter Identifier Service broadcast identifier	5-char hexadecimal	mandatory
cc	Country Code Service broadcast country code	3-char hexadecimal	mandatory

In the United States of America, the tx value is populated by the FCC facility code of the transmitter. However, this does not uniquely distinguish between multicast services. Distinguishing between services on the same frequency shall be conducted at the application level.

5.1.4.1 RadioDNS FQDN Construction

The RadioDNS FQDN construction for an IBOC [4] service is compiled as follows:

```
<tx>.<cc>.hd.radiodns.org
```

5.1.4.2 RadioDNS ServiceIdentifier Construction

The RadioDNS ServiceIdentifier construction for an IBOC service is compiled as follows:

```
hd<separator><cc><separator><tx>
```

5.2 Resolution of Authoritative FQDN

The RadioDNS FQDN, constructed from the broadcast parameters, is used to acquire the Authoritative FQDN. Making a DNS query with a RadioDNS FQDN will return a single CNAME record containing the Authoritative FQDN of the service provider. If no CNAME is returned, then the service has not been registered.

EXAMPLE: Consider an FM service identified by the RadioDNS FQDN:

```
09580.c479.ce1.fm.radiodns.org
```

Using the nslookup tool would yield the following lookup result:

```
canonical name = rdns.musicradio.com
```

Therefore, for this service, the Authoritative FQDN is:

```
rdns.musicradio.com
```

The broadcast parameters should be continuously monitored. If any broadcast parameter changes (for example, a change to the RDS/RBDS PI code), the process of resolving the Authoritative FQDN should be repeated using the new broadcast parameters.

The TTL (Time To Live) parameters of the Authoritative FQDN shall be queried and respected.

Upon expiry of the TTL, the process of resolving the Authoritative FQDN shall be repeated.

If the Authoritative FQDN has changed, then all active applications shall be notified and each application shall repeat its own process for connecting to resources using the updated Authoritative FQDN.

6 Authoritative FQDN and ServiceIdentifier resolution for IP-streamed services

An Authoritative FQDN may also be provided for IP-streamed services, by sending the value as part of the the in-stream metadata of the IP stream. This is defined as the parameter **fqdn**.

Since no broadcast parameters exist for such services, an additional parameter is required to provide disambiguation so that the particular RadioDNS application can determine the exact service being used. This is defined as the parameter **ServiceIdentifier**.

This value must be unique across all services using the same Authoritative FQDN for application discovery, with a maximum character limit of 16 characters in the range [a-z][0-9].

The exact use of this parameter is specific to the RadioDNS application being used.

For any streaming protocol where the **fqdn** and **ServiceIdentifier** parameters are sent as in-stream metadata at regular intervals, the values shall be monitored after they have been initially acquired. If these values are found to change at any point, the old values will be deemed to have expired, and the process of resolving the Authoritative FQDN shall be repeated.

If the Authoritative FQDN has changed, then all active applications shall be notified and each application shall repeat its own process for connecting to resources using the updated Authoritative FQDN.

6.1 Inclusion of parameters into stream metadata

Certain IP streaming transports allow the inclusion of meta-data either as part of an initial response, or within the stream itself. The following sections detail the methods of inserting in-band metadata for some common streaming transports.

6.1.1 Streaming transports

6.1.1.1 ICY (also known as SHOUTcast)

ICY [12] uses the HTTP specification as its base, and features optional periodic metadata in its stream.

The parameters should be contained within the initial HTTP Response at the start of the stream, using the HTTP response header **icy-url**, which has a defined usage within the ICY specification. Its value should be of the form:

```
http://<fqdn>/<ServiceIdentifier>
```

If a Service Provider wishes to also support the intended functionality of this parameter to provide a URL to a website, it is recommended that HTTP requests to this URL are handled appropriately (such as delivering a web-page, or returning an HTTP 302 response to re-direct the browser to an alternative URL).

6.1.1.2 ASF

Advanced Systems Format (ASF) [13] is a container format that is part of the Windows Media framework. It typically defines a payload containing multiple streams of data, e.g. audio and a metadata stream.

An additional stream shall be created, solely containing the Authoritative FQDN and Service Identifier, declared as Custom Metadata using key/value pairs for attributes with the following keys:

radiodns-fqdn for the Authoritative FQDN

radiodns-sid for the ServiceIdentifier

It is recommended that the values be programmatically specified as a null-terminated Unicode string, using the default platform language.

NOTE: If using Windows Media Encoder, this can be entered in as Custom Metadata when setting up the stream.

6.1.1.3 Flash Audio

Flash Audio [14] is a container format for Flash Audio and Video streams.

The parameters must be implemented as a non-persistent Remote Shared Object [15] available on the URI of the Flash Audio stream itself. The object shall be read-only for clients.

The object shall be named: **radiodns**

And have the following named string properties:

fqdn for the FQDN

sid for the ServiceIdentifier

Clients shall listen for changes to these properties and update accordingly.

6.1.2 Metadata intervals

It is desirable that the client receives initial or updated parameters with as short a delay as possible. The cycle time of the metadata parameters will directly affect the speed at which connecting clients can access applications.

It is recommended that service providers ensure that connecting clients receive the parameters within 5 seconds.

7 Authoritative FQDN and ServiceIdentifier resolution from EPG SI

An Authoritative FQDN may also be provided in an EPG SI document [5]. In this case, the Authoritative FQDN and ServiceIdentifier parameters (see clause 6) are provided as attributes of the **radiodns** element, as shown in the example below:

```
<radiodns fqdn="www.heart.co.uk" serviceIdentifier="bristol"/>
```

The methods by which the EPG SI document can be acquired for the service are specified in TS 102 818 [5].

If the EPG SI document is either updated or expires through any applicable mechanism, the old parameters shall be discarded, and the process of resolving the Authoritative FQDN shall be repeated.

If the Authoritative FQDN has changed, then all active applications shall be notified and each application shall repeat its own process for connecting to resources using the updated Authoritative FQDN.

8 Implementation requirements

8.1 Service provider implementation

For broadcast services, a service provider shall support clause 5, Authoritative FQDN resolution for broadcast services. In addition, for services transmitted via FM with RDS/RBDS or DAB, the service provider shall transmit the ECC via RDS Group 1A or DAB FIG 0/9 respectively. For DAB services, the service provider may also support clause 7, Authoritative FQDN resolution from EPG SI.

For IP-streamed services, a service provider shall provide values for the **fqdn** and **ServiceIdentifier** parameters using at least one of the following:

- Clause 6, Authoritative FQDN resolution for IP-streamed Services;
- Clause 7, Authoritative FQDN resolution from EPG SI.

8.2 Device Implementation

For broadcast services, a device shall support Clause 5, Authoritative FQDN resolution for broadcast services. For DAB services, the device may also support clause 7, Authoritative FQDN resolution from EPG SI.

For IP-streamed services, a device shall support the acquisition of values for the **fqdn** and **ServiceIdentifier** parameters from at least one of the the following:

- Clause 6, Authoritative FQDN resolution for IP-streamed Services;
- Clause 7, Authoritative FQDN resolution from EPG SI.

Annex A (normative); Deriving the GCC for a service

The GCC is derived from the received ECC, see A.1. However, receivers need to cope with the situation that the ECC is not transmitted, or when the acquisition time is extended, see A.2.

A.1 Deriving the GCC using ECC

The Global Country Code (GCC) shall be constructed by concatenating the Country Code and the Extended Country Code (ECC) of the service.

For FM RDS/RBDS or DAB/DAB+ audio services, the Country Code of the service is given by the **first** nibble of the RDS/RBDS PI code or DAB SId respectively. The ECC of the service is provided in the RDS Group 1A Block 3 Variant 0 [8] or the DAB FIG 0/9 [1] respectively.

For DAB data services, the Country Code of the service is given by the **third** nibble of the DAB SId. The ECC of the service is provided in the **first** and **second** nibbles of the DAB SId.

In all cases, the 1-character hexadecimal Country Code shall be combined with the 2-character hexadecimal ECC to create the 3-character hexadecimal GCC.

EXAMPLE 1: RDS PI code = C479, ECC = E1: GCC = C + E1 = CE1

EXAMPLE 2: DAB SId = D310, ECC = E0: GCC = D + E0 = DE0

EXAMPLE 3: DAB SId = E1F59B37: GCC = F + E1 = FE1

A.2 Deriving the GCC without ECC

It is strongly recommended that receivers implement the process specified in figure A.1 and use it to derive the GCC if the ECC is not received promptly.

The process uses the Country Code of the Service (see Table A.1) and the ISO 3166 alpha-2 country code of the current location of the receiver, and returns the GCC of the service. The process accounts for border areas, where a receiver may be located in a different country to the country of origination of the service.

Sources of information such as GPS/GSM/GeoIP can provide the ISO 3166 alpha-2 country code for the **current location** of the receiver. The returned GCC shall be used when creating the RadioDNS FQDN.

NOTE:

Table A.1 has been constructed from several sources, which may change over time to reflect changing geo-political situations. The sources are:

- Tables 3-7 in Section 5.4 of TS 101 756 (Digital Audio Broadcasting; Registered Tables)
- List of Countries and Territories by Land and Maritime Borders (Wikipedia; http://en.wikipedia.org/wiki/List_of_countries_and_territories_by_land_and_maritime_borders)
- ISO 3166 alpha-2 Country Codes

Table A.2 lists bordering countries have been removed from Table A.1, either because they are widely separated by water and it is unlikely that radio signals would cross between the countries, or because there is a very small and distant territorial presence claimed as part of the main territory (oceanic islands).

Figure A.1: Process for GCC construction

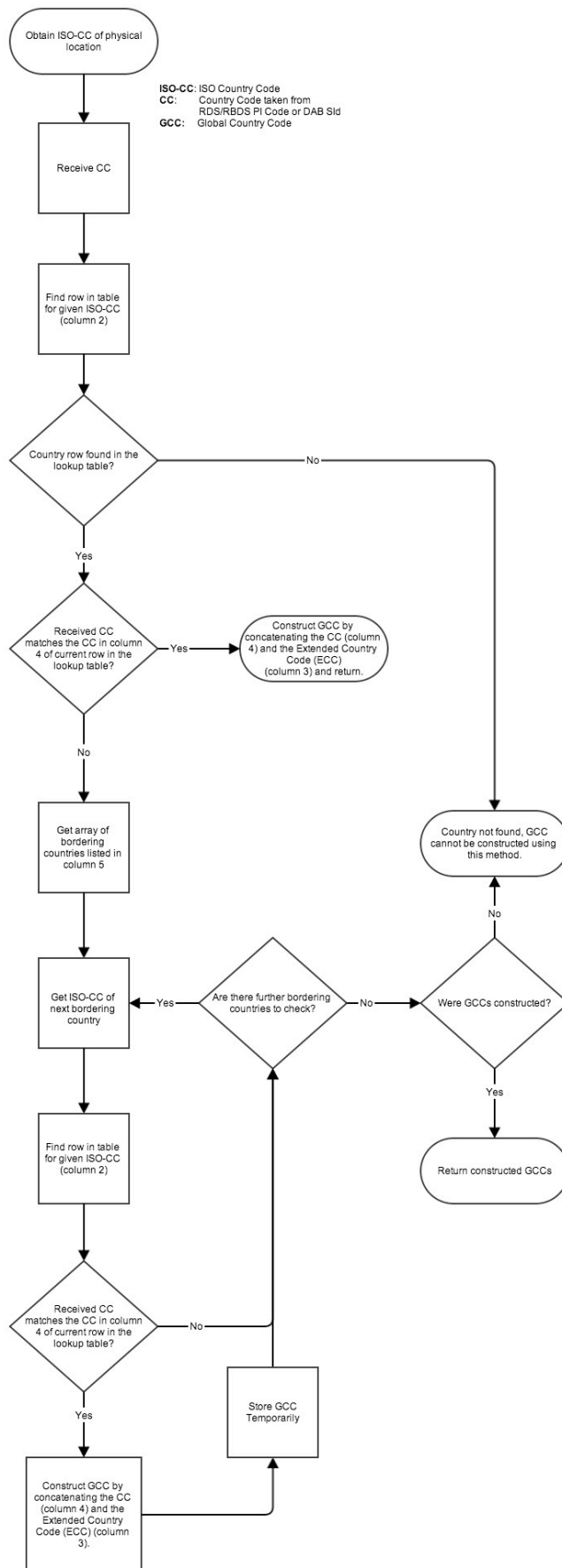


Table A.1: Look-up table for GCC construction

Country	ISO 3166 2-alpha code	Country Code	ECC	Bordering countries look-up (CC:ISO 3166 code)
Afghanistan	AF	A	F0	C:CN;8:IR;4:PK;5:TJ;E:TM;B:UZ
Albania	AL	9	E0	C:HR;1:GR;5:IT;3:MK;D:RS
Algeria	DZ	2	E0	D:LY;5:ML;4:MR;1:MA;8:NE;E:ES;7:TN;3:EH
American Samoa	AS	XXXX	XXXX	4:WS;3:TO;CK;NU;TK
Andorra	AD	3	E0	F:FR;E:ES
Angola	AO	6	D0	CD;C:CG;1:NA;E:ZM
Anguilla	AI	1	A2	2:AG;8:NL;MF;F:VI
Antigua and Barbuda	AG	2	A2	A:KN;1:AI;5:MS;F:FR;BL
Argentina	AR	A	A2	1:BO;B:BR;C:CL;6:PY;9:UY;4:FK
Armenia	AM	A	E4	B:AZ;C:GE;8:IR;3:TR
Aruba	AW	3	A4	B:DO;E:VE
Australia	AU	1;2;3;4;5; 6;7;8	F0	C:ID;9:PG;A:SB;NC
Austria	AT	A	E0	2:CZ;D:DE;1:DE;B:HU;5:IT;9:LI;5:SK;9:SI;4:CH
Azerbaijan	AZ	B	E3	A:AM;C:GE;8:IR;7:RU;3:TR;E:TM
Bahamas	BS	F	A2	1:US;2:US;3:US;4:US;5:US;6:US;7:US;8:US;9:US;A:US;B:US;D:US;E:US
Bahrain	BH	E	F0	8:IR;2:QA;9:SA
Bangladesh	BD	3	F1	B:MM;5:IN
Barbados	BB	5	A2	F:GY;LC;C:VC;6:TT;E:VE
Belarus	BY	F	E3	9:LV;C:LT;8:PL;7:RU;6:UA
Belgium	BE	6	E0	F:FR;D:DE;1:DE;7:LU;8:NL;C:GB
Belize	BZ	6	A2	1:GT;2:HN;F:MX
Benin	BJ	E	D0	B:BF;3:GH;8:NE;F:NG;D:TG
Bermuda	BM	C	A2	
Bhutan	BT	2	F1	C:CN;5:IN
Bolivia	BO	1	A3	A:AR;B:BR;C:CL;6:PY;7:PE
Bosnia and Herzegovina	BA	F	E4	C:HR;1:ME;D:RS
Botswana	BW	B	D1	1:NA;A:ZA;E:ZM;2:ZW
Bouvet Island	BV	XXXX	XXXX	
Brazil	BR	B	A2	A:AR;1:BO;2:CO;F:GY;6:PY;7:PE;8:SR;9:UY;E:VE
British Indian Ocean Territory	IO	XXXX	XXXX	B:MV
British Virgin Islands	VG	F	A5	8:PR;F:VI
Brunei	BN	B	F1	F:MY
Bulgaria	BG	8	E1	1:GR;3:MK;E:RO;D:RS;3:TR
Burkina Faso	BF	B	D0	E:BJ;C:CI;3:GH;5:ML;8:NE;D:TG
Burma	MM	B	F0	3:BD;C:CN;5:IN;1:LA;2:TH
Burundi	BI	9	D1	CD;5:RW;D:TZ
Cambodia	KH	3	F2	1:LA;2:TH;7:VN
Cameroon	CM	1	D0	2:CF;9:TD;C:CG;7:GQ;8:GA;F:NG
Canada	CA	C	A1	1:US;2:US;3:US;4:US;5:US;6:US;7:US;8:US;9:US;A:US;B:US;D:US;E:US;F:GL;F:PM
Cape Verde	CV	6	D1	8:GM;4:MR;7:SN

Cayman Islands	KY	7	A2	9:CU;3:JM
Central African Republic	CF	2	D0	1:CM;9:TD;CD;C:CG;SS;C:SD
Chad	TD	9	D2	1:CM;2:CF;D:LY;8:NE;F:NG;C:SD
Chile	CL	C	A3	A:AR;1:BO;7:PE
China	CN	C	F0	A:AF;2:BT;B:MM;5:IN;9:JP;D:KZ;D:KP;3:KG;1:LA;F:MN;E:NP;4:PK;8:PH;7:RU;5:TJ;7:VN;F:HK;6:MO
Christmas Island	CX	XXXX	XXXX	C:ID
Cocos	CC	XXXX	XXXX	
Colombia	CO	2	A3	B:BR;8:CR;3:EC;D:HT;2:HN;7:NI;9:PA;7:E:VE
Comoros	KM	C	D1	F:FR;4:MG;3:MZ;B:SC;D:TZ;YT
Democratic Republic of the Congo	CD	XXXX	XXXX	6:AO;9:BI;2:CF;C:CG;5:RW;SS;D:TZ;4:UG;E:ZM
Republic of the Congo	CG	C	D0	6:AO;1:CM;2:CF;CD;8:GA
Cook Islands	CK	XXXX	XXXX	1:KI;AS;PF;NU;TK
Costa Rica	CR	8	A2	2:CO;3:EC;7:NI;9:PA
Cte d'Ivoire	CI	C	D2	B:BF;3:GH;9:GN;2:LR;5:ML
Croatia	HR	C	E3	F:BA;B:HU;5:IT;1:ME;D:RS;9:SI
Cuba	CU	9	A2	D:HT;2:HN;3:JM;1:US;4:US;5:US;6:US;8:US;9:US;A:US;B:US;D:US;E:US;7:KY
Curacao	CW	XXXX	XXXX	B:DO;E:VE
Cyprus	CY	2	E1	F:EG;1:GR;4:IL;A:LB;3:TR
Czech Republic	CZ	2	E2	A:AT;D:DE;1:DE;8:PL;5:SK
Denmark	DK	9	E1	D:DE;1:DE;F:NO;8:PL;E:SE;C:GB
Djibouti	DJ	3	D0	ER;E:ET;7:SO;B:YE
Dominica	DM	A	A3	F:FR;E:VE
Dominican Republic	DO	B	A3	2:CO;D:HT;3:AW;CW;8:PR;E:TC
Ecuador	EC	3	A2	2:CO;8:CR;7:PE
Egypt	EG	F	E0	2:CY;1:GR;4:IL;5:JO;D:LY;9:SA;C:SD;3:TR
El Salvador	SV	C	A4	1:GT;2:HN;7:NI
Equatorial Guinea	GQ	7	D0	1:CM;8:GA;F:NG
Eritrea	ER	XXXX	XXXX	3:DJ;9:SA;C:SD;E:ET;B:YE
Estonia	EE	2	E4	6:FI;9:LV;7:RU;E:SE
Ethiopia	ET	E	D1	3:DJ;ER;6:KE;7:SO;SS;C:SD
Falkland Islands	FK	4	A2	A:AR
Faroe Islands	FO	9	E1	A:IS;F:NO;C:GB
Fiji	FJ	5	F1	9:NZ;3:TO;TV;F:VU;NC;WF
Finland	FI	6	E1	2:EE;F:NO;7:RU;E:SE
France	FR	F	E1	3:AD;6:BE;D:DE;1:DE;5:IT;7:LU;B:MC;E:ES;4:CH;C:GB;GG;JE
French Polynesia	PF	XXXX	XXXX	1:KI;CK;PN
Gabon	GA	8	D0	1:CM;C:CG;7:GQ
The Gambia	GM	8	D1	6:CV;7:SN
Georgia	GE	C	E4	A:AM;B:AZ;7:RU;3:TR;6:UA
Germany	DE	D;1	E0	A:AT;6:BE;2:CZ;9:DK;F:FR;7:LU;8:NL;8:PL;E:SE;4:CH;C:GB
Ghana	GH	3	D1	E:BJ;B:BF;C:CI;F:NG;D:TG
Gibraltar	GI	A	E1	1:MA;E:ES
Greece	GR	1	E1	9:AL;8:BG;2:CY;F:EG;5:IT;D:LY;3:MK;3:TR

Greenland	GL	F	A1	C:CA;A:IS;F:NO;SJ
Grenada	GD	D	A3	C:VC;6:TT
Guam	GU	XXXX	XXXX	E:FM
Guatemala	GT	1	A4	6:BZ;C:SV;2:HN;F:MX
Guernsey	GG	C	E1	F:FR;C:JE
Guinea	GN	9	D0	C:CI;A:GW;2:LR;5:ML;7:SN;1:SL
GuineaBissau	GW	A	D2	9:GN;7:SN
Guyana	GY	F	A3	5:BB;B:BR;8:SR;6:TT;E:VE
Haiti	HT	D	A4	F:BS;2:CO;9:CU;B:DO;3:JM;E:TC
Heard Island and McDonald Islands	HM	XXXX	XXXX	
Honduras	HN	2	A4	6:BZ;2:CO;9:CU;C:SV;1:GT;F:MX;7:NI
Hong Kong	HK	F	F1	
Hungary	HU	B	E0	A:AT;C:HR;E:RO;D:RS;5:SK;9:SI;6:UA
Iceland	IS	A	E2	9:FO;F:GL;SJ
India	IN	5	F2	A:AF;3:BD;2:BT;B:MM;C:CN;E:NP;4:PK;C:LK
Indonesia	ID	C	F2	1:AU;2:AU;3:AU;4:AU;5:AU;6:AU;7:AU;8:AU; F:MY;PW;9:PG;8:PH;A:SG
Iran	IR	8	F1	A:AF;A:AM;B:AZ;B:IQ;1:KW;6:OM;4:PK;2:QA;9: SA;3:TR;E:TM;D:AE
Iraq	IQ	B	E1	8:IR;5:JO;1:KW;9:SA;3:TR
Ireland	IE	2	E3	C:GB
Isle of Man	IM	C	E1	C:GB;2:IE
Israel	IL	4	E0	2:CY;F:EG;5:JO;A:LB
Italy	IT	5	E0	9:AL;2:DZ;A:AT;C:HR;F:FR;1:GR;D:LY; 3:SM;9:SI;E:ES;4:CH;7:TN;4:VA
Jamaica	JM	3	A3	2:CO;9:CU;D:HT;7:KY
Japan	JP	9	F2	C:CN;E:KR;8:PH;7:RU;MP
Jersey	JE	C	E1	F:FR;C:GG
Jordan	JO	5	E1	F:EG;B:IQ;4:IL;9:SA
Kazakhstan	KZ	D	E3	C:CN;3:KG;7:RU;E:TM;B:UZ
Kenya	KE	6	D2	E:ET;7:SO;SS;D:TZ;4:UG
Kiribati	KI	1	F1	MH;7:NR;TV;CK;PF;TK
North Korea	KP	D	F0	C:CN;9:JP;E:KR;7:RU
South Korea	KR	E	F1	C:CN;9:JP;D:KP
Kuwait	KW	1	F2	8:IR;B:IQ;9:SA
Kyrgyzstan	KG	3	E4	C:CN;D:KZ;5:TJ;B:UZ
Laos	LA	1	F3	B:MM;3:KH;C:CN;2:TH;7:VN
Latvia	LV	9	E3	F:BY;2:EE;C:LT;7:RU;E:SE
Lebanon	LB	A	E3	2:CY;4:IL
Lesotho	LS	6	D3	A:ZA
Liberia	LR	2	D1	C:CI;9:GN;1:SL
Libya	LY	D	E1	2:DZ;9:TD;F:EG;1:GR;5:IT;8:NE;C:SD;7:TN
Liechtenstein	LI	9	E2	A:AT;4:CH
Lithuania	LT	C	E2	F:BY;9:LV;8:PL;7:RU;E:SE
Luxembourg	LU	7	E1	6:BE;F:FR;D:DE;1:DE
Macau	MO	6	F2	
Republic of Macedonia	MK	3	E4	9:AL;8:BG;1:GR;D:RS

Madagascar	MG	4	D0	C:KM;F:FR;3:MZ;B:SC;YT
Malawi	MW	F	D0	3:MZ;D:TZ;E:ZM
Malaysia	MY	F	F0	B:BN;C:ID;8:PH;A:SG;2:TH;7:VN
Maldives	MV	B	F2	5:IN;C:LK;IO
Mali	ML	5	D0	2:DZ;B:BF;C:CI;9:GN;4:MR;8:NE;7:SN
Malta	MT	C	E0	5:IT;D:LY
Marshall Islands	MH	XXXX	XXXX	1:KI;E:FM;7:NR
Mauritania	MR	4	D1	2:DZ;6:CV;5:ML;1:MA;7:SN;3:EH
Mauritius	MU	A	D3	F:FR;B:SC
Mayotte	YT	XXXX	XXXX	C:KM;4:MG
Mexico	MX	F	A4	6:BZ;1:GT;1:US;2:US;3:US;4:US;5:US;6:US;7:US;8:US;9:US;A:US;B:US;D:US;E:US
Federated States of Micronesia	FM	E	F3	MH;PW;9:PG;GU
Moldova	MD	1	E4	E:RO;6:UA
Monaco	MC	B	E2	F:FR
Mongolia	MN	F	F3	C:CN;7:RU
Montenegro	ME	1	E3	9:AL;F:BA;C:HR;5:IT;D:RS
Montserrat	MS	5	A4	2:AG;F:FR;A:KN;E:VE
Morocco	MA	1	E2	2:DZ;8:PT;E:ES;4:MR;3:EH
Mozambique	MZ	3	D2	C:KM;4:MG;F:MW;A:ZA;5:SZ;D:TZ;E:ZM;2:ZW
Namibia	NA	1	D1	6:AO;B:BW;A:ZA;E:ZM
Nauru	NR	7	F1	1:KI;MH
Nepal	NP	E	F2	5:IN;C:CN
Netherlands	NL	8	E3	6:BE;D:DE;1:DE;A:KN;C:GB;E:VE;1:AI;MF;F:VI
New Caledonia	NC	XXXX	XXXX	1:AU;2:AU;3:AU;4:AU;6:AU;7:AU;8:AU;9:PG;A:SB;F:VU;NF
New Zealand	NZ	9	F1	
Nicaragua	NI	7	A3	8:CR;C:SV;2:HN
Niger	NE	8	D2	2:DZ;E:BJ;B:BF;9:TD;D:LY;5:ML;F:NG
Nigeria	NG	F	D1	E:BJ;1:CM;9:TD;7:GQ;3:GH;8:NE
Niue	NU	XXXX	XXXX	3:TO;AS;CK
Norfolk Island	NF	XXXX	XXXX	9:NZ;NC
Northern Mariana Islands	MP	XXXX	XXXX	9:JP
Norway	NO	F	E2	9:DK;6:FI;A:IS;7:RU;E:SE;C:GB;F:GL
Oman	OM	6	F1	8:IR;4:PK;9:SA;D:AE;B:YE
Pakistan	PK	4	F1	A:AF;C:CN;5:IN;8:IR;6:OM
Palau	PW	XXXX	XXXX	C:ID;E:FM;8:PH
Panama	PA	9	A3	2:CO;8:CR
Papua New Guinea	PG	9	F3	1:AU;2:AU;3:AU;4:AU;5:AU;6:AU;7:AU;8:AU;C:ID;E:FM;A:SB;NC
Paraguay	PY	6	A3	A:AR;1:BO;B:BR
Peru	PE	7	A4	1:BO;B:BR;C:CL;2:CO;3:EC
Philippines	PH	8	F2	C:ID;9:JP;F:MY;PW;7:VN;D:TW
Pitcairn Islands	PN	XXXX	XXXX	PF
Poland	PL	8	E4	F:BY;2:CZ;9:DK;D:DE;1:DE;C:LT;7:RU;5:SK;E:SE;6:UA
Portugal	PT	8	E0	1:MA;E:ES

Puerto Rico	PR	8	A3	B:DO;E:VE;F:VG
Qatar	QA	2	F2	E:BH;8:IR;9:SA;D:AE
Romania	RO	E	E1	8:BG;B:HU;1:MD;D:RS;3:TR;6:UA
Russia	RU	7	E0	B:AZ;F:BY;C:CN;2:EE;6:FI;C:GE;D:KZ;9:LV;C:L T;F:MN;F:NO;8:PL;E:SE;6:UA;1:US;2:US;3:US; 4:US;5:US;6:US;7:US;8:US;9:US;A:US;B:US;D: US;E:US
Rwanda	RW	5	D3	9:BI;CD;D:TZ;4:UG
Saint Barthlemy	BL	XXXX	XXXX	2:AG;8:NL;A:KN;SX
Saint Helena Ascension and Tristan da Cunha	SH	A	D1	
Saint Kitts and Nevis	KN	A	A4	2:AG;8:NL;E:VE;5:MS;BL
Saint Lucia	LC	XXXX	XXXX	5:BB;F:FR;C:VC;E:VE
Saint Martin	MF	XXXX	XXXX	8:NL;1:AI;SX
Saint Pierre and Miquelon	PM	F	A6	C:CA
Saint Vincent and the Grenadines	VC	C	A5	5:BB;D:GD;LC;6:TT;E:VE
Samoa	WS	4	F2	3:TO;AS;TK;WF
San Marino	SM	3	E1	5:IT
Saudi Arabia	SA	9	F0	E:BH;F:EG;ER;8:IR;B:IQ;5:JO;1:KW;6:OM;2:QA ;C:SD;D:AE;B:YE
Senegal	SN	7	D1	6:CV;8:GM;9:GN;A:GW;5:ML;4:MR
Serbia	RS	D	E2	9:AL;F:BA;8:BG;C:HR;B:HU;3:MK;1:ME;E:RO
Seychelles	SC	B	A4	C:KM;4:MG;A:MU;D:TZ
Sierra Leone	SL	1	D2	9:GN;2:LR
Singapore	SG	A	F2	C:ID;F:MY
Sint Maarten	SX	XXXX	XXXX	BL;MF
Slovakia	SK	5	E2	A:AT;2:CZ;B:HU;8:PL;6:UA
Slovenia	SI	9	E4	A:AT;C:HR;5:IT;B:HU
Solomon Islands	SB	A	F1	1:AU;2:AU;3:AU;4:AU;5:AU;6:AU;7:AU;8:AU;9:P G;F:VU;NC
Somalia	SO	7	D2	3:DJ;E:ET;6:KE;B:YE
South Africa	ZA	A	D0	B:BW;6:LS;3:MZ;1:NA;5:SZ;2:ZW
South Georgia and the South Sandwich Islands	GS	XXXX	XXXX	
South Sudan	SS	XXXX	XXXX	2:CF;CD;E:ET;6:KE;C:SD;4:UG
Spain	ES	E	E2	2:DZ;3:AD;F:FR;5:IT;1:MA;8:PT;A:GI
Sri Lanka	LK	C	F1	5:IN;B:MV
Sudan	SD	C	D3	2:CF;9:TD;F:EG;ER;E:ET;D:LY;SS
Suriname	SR	8	A4	B:BR;F:FR;F:GY
Svalbard	SJ	XXXX	XXXX	7:RU;F:GL
Swaziland	SZ	5	D2	3:MZ;A:ZA
Sweden	SE	E	E3	9:DK;2:EE;6:FI;D:DE;1:DE;C:LT;F:NO;8:PL;7:R U
Switzerland	CH	4	E1	A:AT;F:FR;5:IT;9:LI;D:DE;1:DE
Taiwan	TW	D	F1	C:CN;9:JP;8:PH
Tajikistan	TJ	5	E3	A:AF;C:CN;3:KG;B:UZ
Tanzania	TZ	D	D1	9:BI;C:KM;CD;6:KE;F:MW;3:MZ;5:RW;B:SC;4:U G;E:ZM
Thailand	TH	2	F3	B:MM;3:KH;5:IN;C:ID;1:LA;F:MY;7:VN
Togo	TG	D	D0	E:BJ;B:BF;3:GH

Tokelau	TK	XXXX	XXXX	1:KI;4:WS;AS;CK;WF
Tonga	TO	3	F3	5:FJ;9:NZ;4:WS;AS;NU;WF
Trinidad and Tobago	TT	6	A4	5:BB;D:GD;F:GY;E:VE
Tunisia	TN	7	E2	2:DZ;5:IT;D:LY
Turkey	TR	3	E3	A:AM;B:AZ;8:BG;2:CY;F:EG;C:GE;1:GR;8:IR;B:I Q;E:RO;7:RU;6:UA
Turkmenistan	TM	E	E4	A:AF;8:IR;D:KZ;B:UZ
Turks and Caicos Islands	TC	E	A3	F:BS;B:DO;D:HT
Tuvalu	TV	XXXX	XXXX	5:FJ;1:KI;WF
Uganda	UG	4	D2	CD;6:KE;5:RW;SS;D:TZ
Ukraine	UA	6	E4	F:BY;B:HU;C:GE;1:MD;8:PL;E:RO;7:RU;5:SK;3: TR
United Arab Emirates	AE	D	F2	8:IR;6:OM;2:QA;9:SA
United Kingdom	GB	C	E1	6:BE;9:DK;F:FR;D:DE;1:DE;2:IE;8:NL
United States	US	1;2;3;4;5; 6;7;8;9;A; B;D;E	A0	C:CA;9:CU;1:KI;F:MX;7:RU
United States Virgin Islands	VI	F	A5	8:NL;E:VE;1:AI;F:VG
Uruguay	UY	9	A4	A:AR;B:BR
Uzbekistan	UZ	B	E4	A:AF;D:KZ;3:KG;5:TJ;E:TM
Vanuatu	VU	F	F2	5:FJ;A:SB;NC
Vatican City	VA	4	E2	5:IT
Venezuela	VE	E	A4	5:BB;B:BR;2:CO;A:DM;F:GY;8:NL;LC;C:VC;6:T T;3:AW;CW;8:PR
Vietnam	VN	7	F2	3:KH;C:CN;C:ID;1:LA;F:MY;8:PH;2:TH
Wallis and Futuna	WF	XXXX	XXXX	5:FJ;4:WS;3:TO;TV;TK
Western Sahara	EH	3	D3	2:DZ;4:MR;1:MA;E:ES
Yemen	YE	B	F3	3:DJ;ER;6:OM;9:SA;7:SO
Zambia	ZM	E	D2	6:AO;B:BW;CD;F:MW;3:MZ;1:NA;D:TZ;2:ZW
Zimbabwe	ZW	2	D2	B:BW;3:MZ;A:ZA;E:ZM

Table A.2: Countries considered non-bordering for the purposes of GCC construction

Country	ISO 3166 2-alpha code	Bordering Country removed from Table A.1	Reason for removal
Albania	AL	Montenegro	>200km separation over land
Algeria	DZ	Italy	>200km separation over sea
Australia	AU	New Zealand	>200km separation over sea
Bahamas	BS	Cuba	>200km separation over sea
Bahamas	BS	Haiti	>200km separation over sea
Bahamas	BS	Turks and Caicos Islands	>200km separation over sea
Barbados	BB	France	>200km separation over sea
Brazil	BR	France	>200km separation over sea
Cayman Islands	KY	Colombia	>200km separation over sea
Cayman Islands	KY	Honduras	>200km separation over sea
China	CN	Taiwan	>200km separation over sea
China	CN	South Korea	>200km separation over sea

Colombia	CO	Dominican Republic	>200km separation over sea
Colombia	CO	Jamaica	>200km separation over sea
Colombia	CO	Peru	>200km separation over sea
Colombia	CO	Cayman Islands	>200km separation over sea
Cuba	CU	Bahamas	>200km separation over sea
Cuba	CU	Mexico	>200km separation over sea
Cuba	CU	United States	>200km separation over sea
Cuba	CU	United States	>200km separation over sea
Cuba	CU	United States	>200km separation over sea
Cuba	CU	United States	>200km separation over sea
Dominican Republic	DO	Venezuela	>200km separation over sea
Honduras	HN	Cayman Islands	>200km separation over sea
India	IN	Thailand	>200km separation over sea
India	IN	Maldives	>200km separation over sea
India	IN	Indonesia	>200km separation over sea
Indonesia	ID	Thailand	>200km separation over sea
Indonesia	ID	India	>200km separation over sea
Indonesia	ID	Vietnam	>200km separation over sea
Indonesia	ID	Philippines	>200km separation over sea
Iran	IR	Bahrain	>200km separation over sea
Italy	IT	Malta	>100km separation over sea
Italy	IT	Montenegro	>200km separation over sea
Japan	JP	North Korea	>200km separation over sea
Japan	JP	Taiwan	>200km separation over sea
Libya	LY	Malta	>200km separation over sea
Mexico	MX	Cuba	>200km separation over sea
Mexico	MX	Honduras	>200km separation over sea
Mozambique	MZ	France	>200km separation over sea
New Caledonia	NC	Australia	>200km separation over sea
New Caledonia	NC	Fiji	>200km separation over sea
New Zealand	NZ	Australia	>200km separation over sea
New Zealand	NZ	Tonga	>200km separation over sea
New Zealand	NZ	Australia	>200km separation over sea
New Zealand	NZ	Fiji	>200km separation over sea
Nicaragua	NI	Colombia	>200km separation over sea
Norway	NO	Faroe Islands	>200km separation over sea
Philippines	PH	China	>200km separation over sea
Russia	RU	Japan	>200km separation over sea
Russia	RU	North Korea	>200km separation over sea
Russia	RU	Turkey	>200km separation over sea
Spain	ES	Western Sahara	>100km separation over sea
Sudan	SD	Saudi Arabia	>200km separation over sea
Sweden	SE	Latvia	>100km separation over sea

Turkmenistan	TM	Azerbaijan	>200km separation over sea
United Kingdom	GB	Faroe Islands	>200km separation over sea
United Kingdom	GB	Norway	>200km separation over sea
United States	US	Bahamas	>100km separation over sea
Venezuela	VE	Montserrat	>200km separation over sea
Venezuela	VE	Dominican Republic	>200km separation over sea
Venezuela	VE	Saint Kitts and Nevis	>200km separation over sea
Venezuela	VE	France	>200km separation over sea
Venezuela	VE	United States Virgin Islands	>200km separation over sea

History

Document history		
V1.1.1	May 2014	draft/ljc/nap