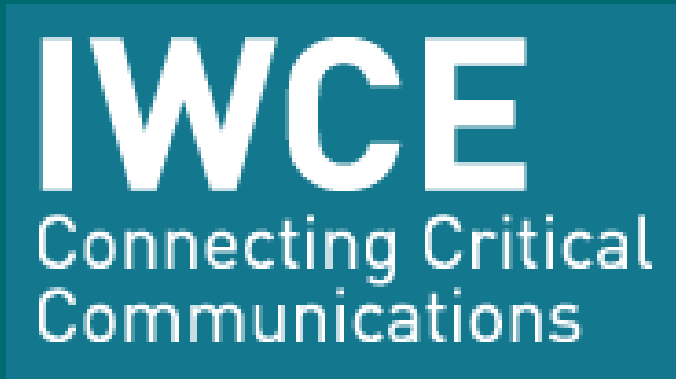




DMR Technology and Deployment Case Studies



Las Vegas, 28th September 2021

Tom Bohn

DMR System Design, Motorola Solutions, Inc
Technical Working Group Chair, DMR Association

WHY DMR?

**Modern – Digital - Future proof – High Performance –
Feature Rich - Highly Spectrum Efficient – Fits in
existing Analogue Licencing - Secure – Value for
money**

**And for the Accountants/Shareholders - Low Risk
of ownership**

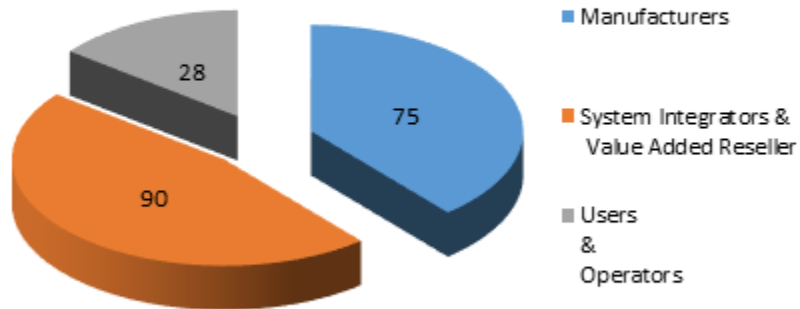
How?



How many Manufactures offer DMR and want your business?

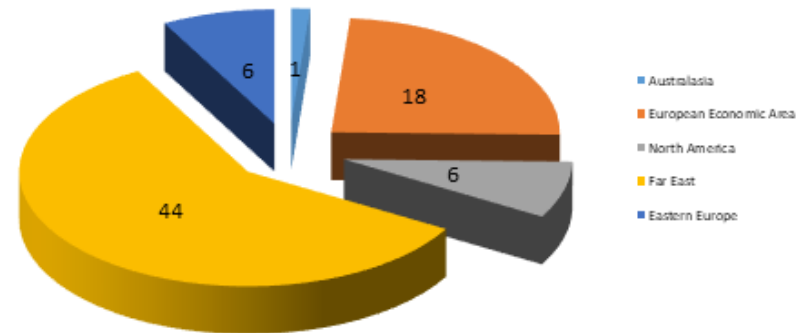
ETSI DMR Manufacturers

DMR Association - Membership



**Total of 193 Members.
75 of them are
Manufacturers
(Category 1).**

DMR Association - Category 1 Members



21st century digital radio standard

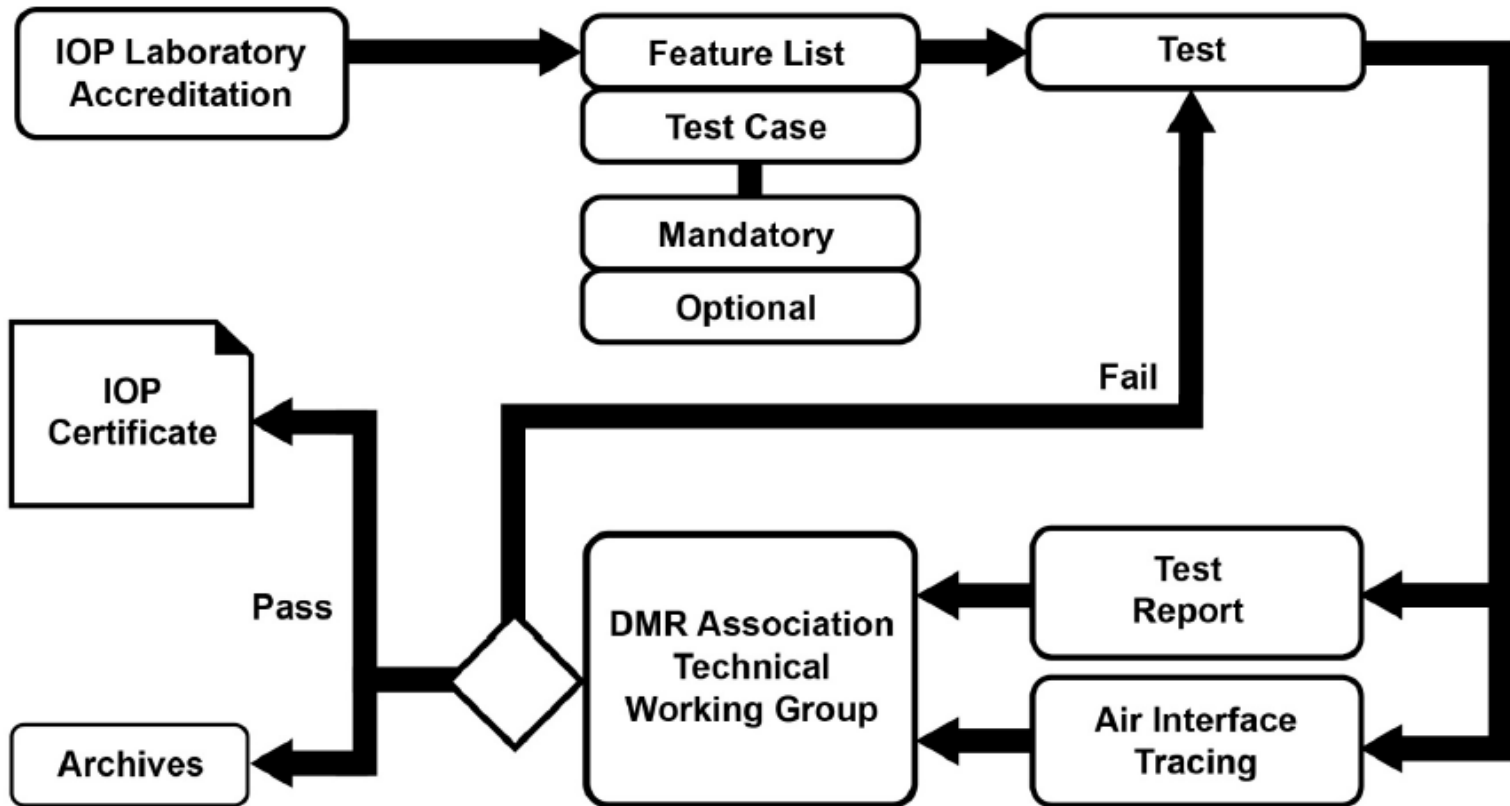
- We work with our members, worldwide, to ensure that DMR Digital Mobile Radio is the most widely supported digital business radio standard
- Our members are companies, organisations and individuals who use or build DMR products professionally or those working to support the DMR standard in other ways
- By using a combination of education, awareness, certification and interoperability training we operate to make sure that business buyers of today's digital radio technology have the security of knowing that they are investing in the future
- We're here to ensure that DMR products exist within a successful, open, multi-vendor chain

The DMR Association: Mission and Objectives

For DMR we do:

- Operate an equipment interoperability testing and certification program
- Communicate with the user community to capture new requirements
- Enhance the feature set of DMR with new functions.
- Offer education and updates about the standard
- Give advice to regulators to ascertain an environment in which the technology can flourish

The DMR Association: The Interoperability Process



The DMR Association: The Interoperability Test Cases

Test case 4: Emergency Pre-Emption of Payload Channel with Reverse Channel Signalling. Multi-Site

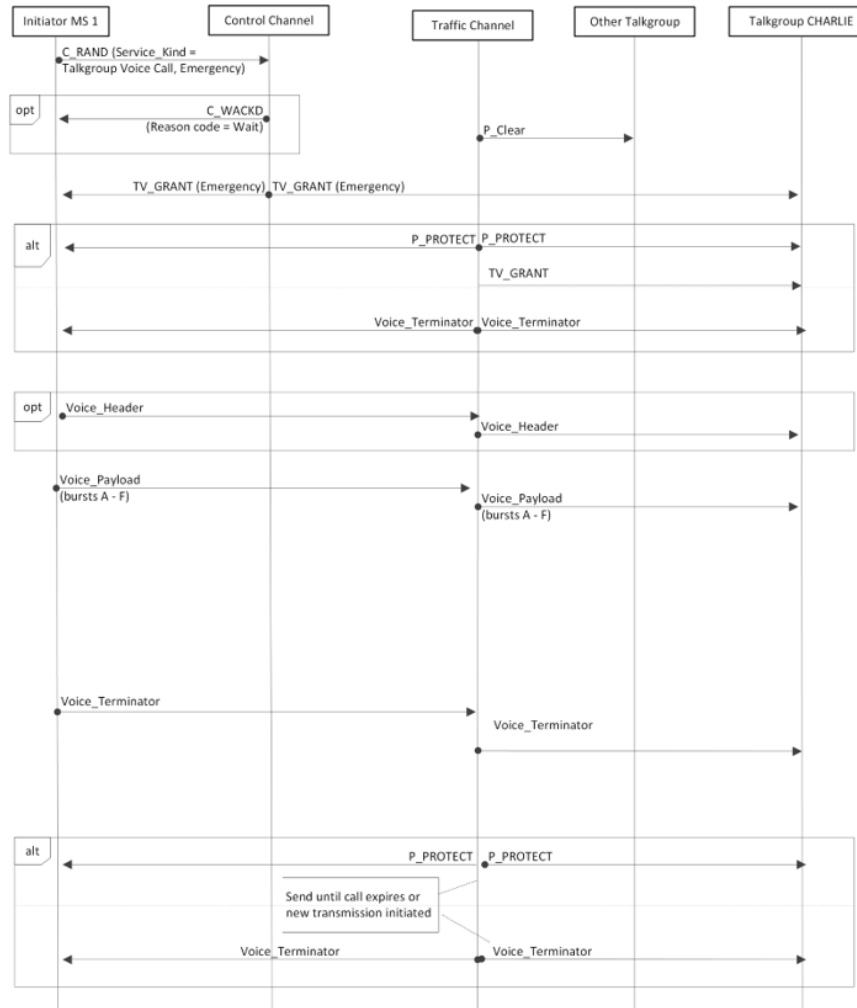
Test case id: @IOP_T3_Emergency_PreEmption_PayloadChan_RevChanSig

Procedure

- 1) Set-up the trunking system so that on Site 1 only one control channel and two payload channels on a separate frequency pair are available. Also ensure that at least two payload channels are available on Site 2. This can be either achieved by the system restricting access to certain channels or “occupying” the channel by a mobile that is not part of the actual test setup.
- 2) Set up a group call on MS 6 to talkgroup ECHO and initiate a transmission
- 3) Set up a group call on MS 4 to talkgroup DELTA and initiate a transmission
- 4) Confirm that MS 5 can hear and clearly understand MS4’s transmission. MS 1, MS 2 and MS 3 can not hear MS 4’s transmission.
- 5) End talking on MS 4.
- 6) While no MS is transmitting in the call from MS 6 to talkgroup ECHO and no MS is transmitting in the call from MS 4 to talkgroup DELTA, initiate an emergency group call from MS 1 to Talkgroup CHARLIE.
- 7) **Pass Criterion:** The manufacturer specific information on the radios shows that one of the normal calls on Site 1 has been ended.
- 8) **Pass Criterion:** The manufacturer specific information on MS 1 shows that the emergency call has successfully been set up
- 9) **Pass Criterion:** Confirm that MS 2 and 3 can hear and clearly understand MS 1’s transmission.
- 10) End the call from MS 1.
- 11) **Pass Criterion:** The manufacturer specific information on MS 1 shows that the call has ended and has left the payload channel and that the trunked system releases the payload channel resource.

The DMR Association: The Interoperability Test Cases

MSC Emergency Talkgroup Voice Pre-empting Payload Channel, Site 1, Part 1



The DMR Association: The Interoperability Air I/F Tracing

No.	Time	Source	Destination	Protocol	Length	Info
	65 9.539188000	192.168.0.1	192.168.0.100	DMR	86	INBOUND - CSBK - C_RAND: GRP_V_SRV from 3

Frame 65: 86 bytes on wire (688 bits), 86 bytes captured (688 bits) on interface 0
Ethernet II, Src: Prod-E1_00:23:6a (00:16:64:00:23:6a), Dst: 38:63:bb:b9:37:c7 (38:63:bb:b9:37:c7)
Internet Protocol Version 4, Src: 192.168.0.1 (192.168.0.1), Dst: 192.168.0.100 (192.168.0.100)
User Datagram Protocol, Src Port: scp-config (10001), Dst Port: scp-config (10001)
Digital Mobile Radio Protocol (DMR), Tracer Release: Selex-ES Tracer 2 (PAT2)
Time Stamp Packet : 9628590 cells (1203573,750000 ms)
DMR Time since beginning of capture: 9540,000
Physical Layer (Layer 1), Channel: Inbound Data
Data Link Layer (Layer 2), Burst Type: CSBK
Color Code: 0
Payload after BPTC (196,96) Decoding: 9f 00 00 01 00 00 03 00 00 03 6f 97
Last Block (LB): 1 - Protect Flag (PF): 0 - Manufacturers Feature ID (MFID): 00
Checksum: CRC 16 - CCITT, (0x6f97) [correct]
Call Control Layer (Layer 3)
Tier III PDU type: C_RAND (Random Access Request)
Service_Kind: 0x1 (GRP_V_SRV - Talkgroup Voice Call Service)
Service_Options: 0x00
EMERG: 0 (Non-emergency service)
PRIVACY: 0 (Text/Voice plain)
SUPED_SV: 0 (No Supplementary_user data Transfer Service required for this call)
BCAST_SV: 0 (Non-broadcast service)
OVCM_SV: 0 (Non-OVCM call)
PRIORITY_SV: 0 (Normal -low- priority)
Proxy Flag (PROXY): 0 (Number of Extended BCD digits for addressing through a gateway = 1 to 20)
Appended Supplementary_Data (SUPED_VAL): 0 (Number of appended UDTs required to transport supplementary_user data)
Ambient Listening Service (ALS_SERV): 0 (Ambient Listening Service not requested)
Target_address: 3 [0x000003]
Source_address: 3 [0x000003]
Common Announcement Channel (CACH)
TDMA Channel: TS1
Inbound Signal (MS Sourced): No more CACH Information

The DMR Association Relationship with ETSI

The signatories:

ETSI (The European Telecommunications Standards Institute) produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, broadcast and Internet technologies. Our standards enable the technologies on which business and society rely. ETSI is an industry-led standards development organization with a membership of over 850 manufacturers, network operators, service providers, research bodies, regulatory bodies and universities from 65 countries. ETSI aims to produce globally applicable standards and is officially recognized by the European Union as a European Standardization Organization.

The Digital Mobile Radio Association (**DMR Association**) is a global non profit industry association dedicated to promote the success of DMR technology by removing barriers to interoperability and supporting innovation and adoption of DMR. The Association is operating an interoperability testing and certification program to guarantee a genuine multi-vendor market for DMR equipment. By using a combination of education, awareness, certification and interoperability training, the Association operates to make sure that business buyers of today's digital radio technology have the security of knowing that they are investing in the future.

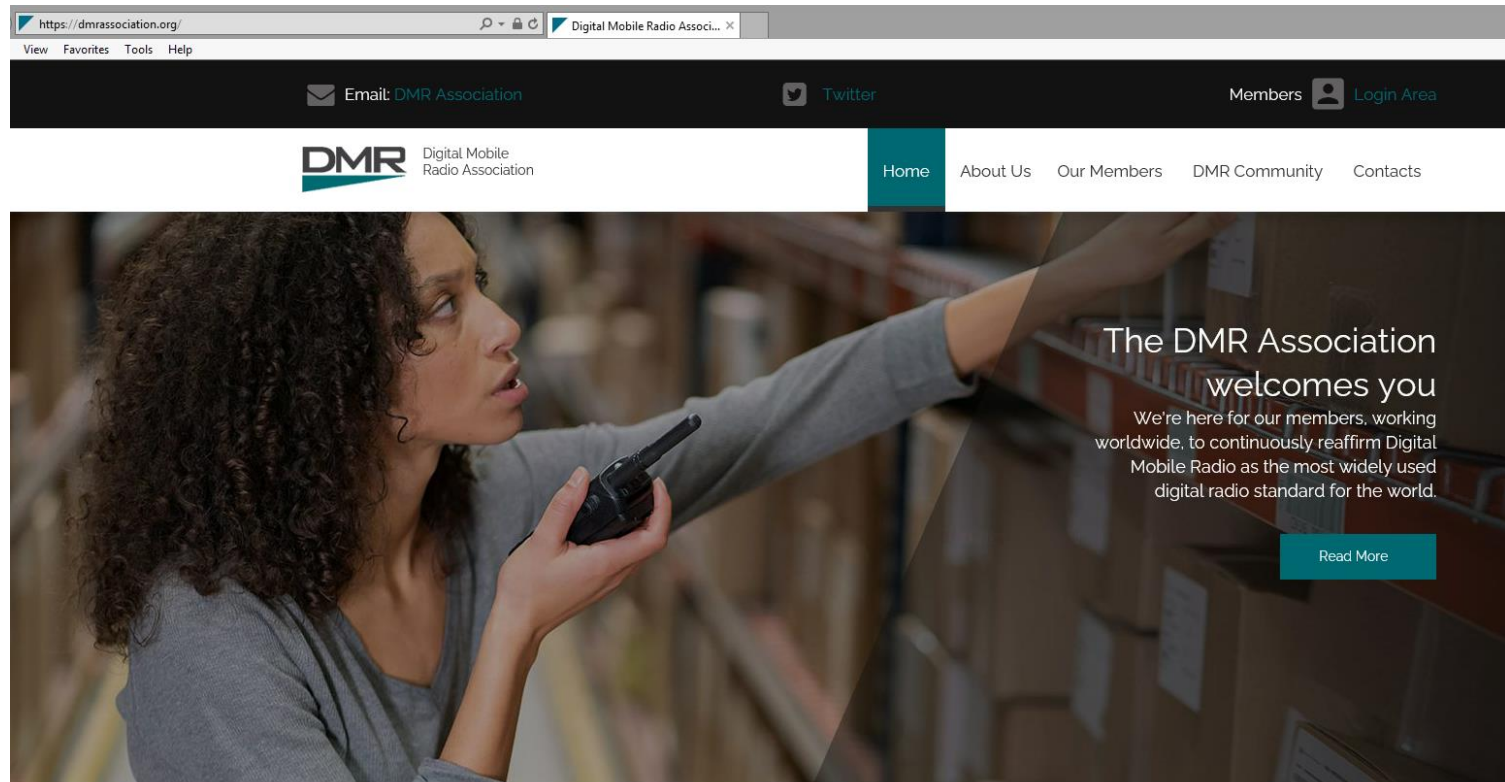
Overall objective:

ETSI and the **DMR Association** have the common objective to perform and promote, directly or indirectly, regional and international standardization with the aim of contributing to the establishment of a global information infrastructure.

ETSI and the **DMR Association** co-operate in the area of digital mobile radio systems and work together for their mutual benefit. Furthermore the parties may seek to encourage and develop collaborative activities in various ways, including the exchange of ideas and expertise in relation to the European Union's policy towards standardization in general.

ETSI and the **DMR Association** have noted the necessity of structuring and strengthening their relationship and fostering a closer co-operation.

The DMR Association: Website



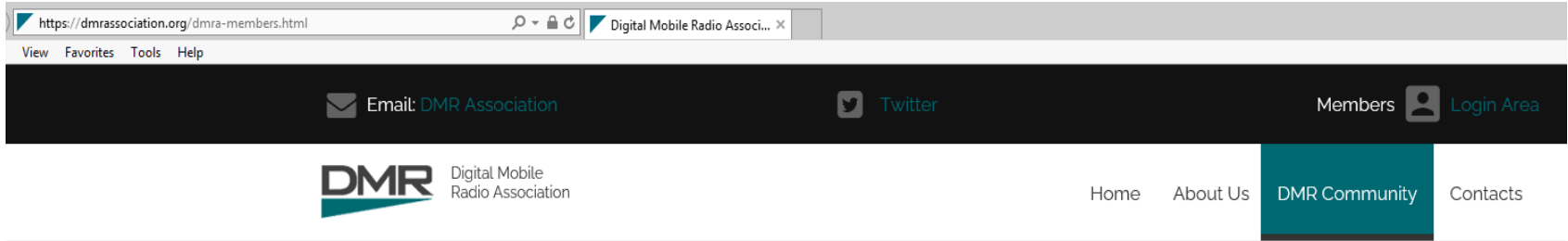
Digital Mobile Radio (DMR) is trusted by over 15 Million Users

Welcome to the DMR Association; we're here for our members, working worldwide, to continuously reaffirm Digital Mobile Radio as the most widely used digital radio standard.

We began in 2005 as a group of market leading public mobile radio manufacturers to support ETSI during the DMR standardisation process.

The DMR Association's Technical Working Group works constantly on the Interoperability process, providing standards certification for manufacturers, the majority of which is at the highest Tier 3 specification. Membership is open to all organisations or individuals where DMR is a regular part of their business and for those working to support the professional use of the DMR standard in other ways.

The DMR Association: Website - Members



Members of the DMR Association

- > **Category 1** – Full Members, Manufacturers
- > **Category 2** – Application Developers, System Integrators, Test Equipment Manufacturers, Test Houses
- > **Category 3** – Users, Regulators and Operators
- > **Non Member** – Partnerships

+ Category 1 members:

+ Category 2 members:

+ Category 3 members:

+ Non Member Partnerships

Category 2 & 3 members:
opportunity to drive improvements

HAVE YOUR SAY!

We know how important it is for dealers to understand the needs of users to continually deliver the best service.

As such the DMR Association is creating a dedicated User Group for category 2 and 3 members to provide a means to communicate with each other. There will be no joining fee for DMR members.

The voice of the User Group will be used as a valuable tool to inform DMRA manufacturers and technical working group members of the issues that are important to you, such as improvements to the ETSI DMR standard.

If you'd be interested in joining the User Group, email brian@seedle.co.uk Thank you.

The DMR Association: Website Documents

The screenshot shows a web browser window with the URL <https://dmrassociation.org/dmr-documents.html>. The browser's address bar and tabs are visible at the top. Below the browser, the website's navigation bar includes links for "Email: DMR Association", "Twitter", "Members", and "Login Area". The main navigation menu contains "Home", "About Us", "DMR Community", and "Contacts".

DMR Documents

DMR Association Whitepapers

- [DMR Radio Performance Characteristics & Channel Sharing with other Radio Types](#)
- [FCC Narrowbanding Mandates](#)
- [Benefits and Features of DMR](#)
- [DMR Interoperability Process V1.1 \(2018\)](#)
- [Why choose Private Digital PMR Networks over Public Network](#)

(Presentation) Critical Communications Russia 2021

- [Why DMR? \(presented by Alessandro Guido\)](#)

(Presentation) Critical Communications Russia 2020

- [DMR Tier III Standard and Case Studies \(presented by Alessandro Guido\)](#)

(Presentation) PMR Expo, Cologne, Germany; 26 to 28 November 2019

- [Powerful new features in the ETSI DMR standards \(presented by Tom Johnson\)](#)

(Presentation) 19-20 September 2019 - XIII International Forum Moscow

- [New functions of DMR Tier III \(presented by Alessandro Guido\)](#)

(Presentation) IWCE USA 2019

- [DMR Tier III A Global Standard for Critical Communications](#)

The DMR Association: Website - IOP Certificates

https://dmrassociation.org/iop-certificates-and-test-results.html#

Email: DMR Association Twitter Members [Login Area](#)

DMR Digital Mobile Radio Association

Home **About Us** DMR Community Contacts

Certificates and Summary of the Test Results

Please Note: Starting from session 2018-001 IOP up to 2020-002 certificates are digitally signed and protected against modification using a GlobalSign CA2 certificate. From 2020-003 onwards all documents are signed using DocuSign. A certificate's authenticity can be verified by opening the document in Adobe Acrobat DC or Adobe Acrobat Reader DC. The document signing certificate information will be visible at the top of the certificate page. For any queries on the validity or authenticity of DMRA IOP certificates please contact the Chair of the Technical Working Group twgchair@dmrassociation.org. Furthermore note that from session 2018-001 all Tier 3 IOP sessions include the version of TS 102 361-4 supported during the test session which allows the viewer to determine version compatibility.

Search for Certificates By Certificate Date

- + 2020
- + 2019
- + 2018
- + 2017
- + 2016
- + 2015
- + 2014
- + 2013
- + 2012
- + 2011
- + 2010

The DMR Association: Website Sections Visits

What pages do user visit?

Page	Page Views
/	3,749
/dmr-standards.html	1,378
/dmra-members.html	1,018
/product-showcase.html	772
/index.html	770
/dmr-key-benefits.html	409
/dmr-documents.html	333
/iop-certificates-and-test-results.html	329
/about-dmra.html	290
/dmr-iop-certification.html	231

Last 90 days

The DMR Association: Geographical Areas of Website Visitors

Visits by Countries

1.	 United States	867 (23.37%)
2.	 China	512 (13.80%)
3.	 India	448 (12.08%)
4.	 Russia	174 (4.69%)
5.	 United Kingdom	115 (3.10%)
6.	 Japan	103 (2.78%)
7.	 Germany	93 (2.51%)
8.	 Indonesia	72 (1.94%)
9.	 Italy	61 (1.64%)
10.	 Brazil	60 (1.62%)

Last 90 days

ETSI DMR Fundamental Motives

Interoperability with a wide choice of manufacturers



Mature and Global Presence – 15 million users



Fits in existing narrow band licenced channels. 2 in 12½kHz



High performance with value for money



Voice security built in



Proven by a huge catalogue of case studies



DMR

DIGITAL MOBILE RADIO ASSOCIATION



Thank You!

<https://dmrassociation.org>