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| **WORLD METEOROLOGICAL ORGANIZATION****\_\_\_\_\_\_\_\_\_\_\_\_\_\_****COMMISSION FOR BASIC SYSTEMS****EXPERT TEAM ON TELECOMMUNICATIONS INFRASTRUCTURE (ET-CTS)****Brasilia, Brazil. 18-21 March 2014** |  | **CBS/ET-CTS 2014-Report** **\_\_\_\_\_\_\_****Ver: 02. (15 Aug 2014)****ENGLISH only** |

FINAL REPORT

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ET-CTS 2014 Meeting Report



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# 1. Organisation of the meeting

1. A meeting of the CBS Expert Team on Telecommunications Infrastructure (ET-CTS) took place in Brasilia, Brazil from 18 to 21 March 2014 The meeting was chaired by the chair of ET-CTS, Mr Remy GIRAUD (France) and hosted at INMET. Mr José Mauro REZENDE (Brazil) opened the meeting, welcoming all to Brasilia on behalf of Dr Antonio Divino MOURA, Permanent Representative to Brazil and First Vice President of WMO. Mr Rezende also provided information on the local arrangements and facilities. The chair thanked INMET for hosting the meeting and for their hospitality. He welcomed participants to the meeting and thanked them for their contributions and participation.
2. The chair led a “tour de table” for participants to introduce themselves. A list of participants in [Annex 3](#_Annex_3_–) to this report.
3. The meeting reviewed and agreed on the agenda ([Doc01r1](http://wis.wmo.int/doc%3D3113)), see [Annex 1](#_Annex_1_–), the document allocation plan ([Info04](http://wis.wmo.int/doc%3D3091?page=ET-CTS-2014-DocPln)) and on the work plan (Info09r2). The structure of this report follows the agenda, although issues were covered in order of the work plan.
4. The secretariat provided participants an overview of WIS including the status if preparation of regulatory material, parts of which ET-WISC is responsible for maintaining. The meeting noted that the Manual on WIS (WMO No 1060[[1]](#footnote-1)) had been updated, particular with a new Part V and associated annex on WIS discovery metadata, and the Guide to WIS (WMO No 1061[[2]](#footnote-2)) had now been published. The Manual on GTS (WNO No 386[[3]](#footnote-3)) was published. Updates proposed by previous ET-CTS meetings and approved by CBS were included in these publications, all of which are dated as 2013. ET-CTS was pleased to see that the “Guide on IT Security” (WMO No 1115[[4]](#footnote-4)) and the “Guide on VPN via the Internet between GTS centres” (WMO No 1116[[5]](#footnote-5)) had now been published with WMO publication numbers, making them much easier and more authoritative to reference from other material. It expressed concern about the time it took these publications updated by ET-CTS over two years ago to reach final publication, and noted that this will be quicker in the future as the documents have now been through the formal editing process and ET-CTS contributors, are more familiar with the process and requirements of the editors.
5. The secretariat reported that Regional WIS implementation plans are now being developed based on the documentation, and noted that the recent meeting of TT-GISC decided to use the IT Security Guide rather than reinventing its own text when developing GISC procedures. This is a very positive result.
6. The meeting noted the recent workshops on WIS competencies and WIS monitoring, both of which are addressed under other agenda items 3.5 and 3.6 respectively.
7. The chair amplified that an important role of ET-CTS related to monitoring and training. ET-CTS need to ensure Members are provided with the right level of education and training so that WIS can work. Members should be able to assess if they have the right competencies and knowledge to answer the questions “Can I implement WIS in my country? “

# 2. Review of the current status of implementation of TCP/IP procedures and applications at WIS centres

## Argentina

1. Mr José-Luis GIANNI introduced the status report from Argentina ([Doc23](http://wis.wmo.int/gts-vpn)). The meeting noted that RTH Buenos Aires was had installed and activated their new WIS functionality (http://dcpc.smn.gov.ar) and continue to work with Brazil in supporting region III. It noted that the RA III VPN network has been operational since 2009 and the current link status as provided in the report. It appreciated that Argentina will work with Brazil to provide relevant spaghetti diagrams for representing the RA III network.
2. Mr Gianni reported that Argentina will have its own communications satellite from mid-2014 and provided some details on its coverage for Argentina and future missions coverage for all of South America.
3. The meeting noted that human resources are an issue and that having sufficient qualified staff is a must for meeting all the future challenges.

## ASECNA

1. Mr Cumbi Hugues AYINA AKILOTAN introduced the status report for ASECNA ([Doc 25](http://wis.wmo.int/doc%3D3025)). The meeting noted that the current status of RTHs Dakar, Brazzaville and Niamey and the associated telecommunication connectivity. It noted that the majority of connections were via v-sat using TCP/IP and that those still on V24 were planned to migrate to TCP/IP in next upgrade. Some sites still utilising only the AFTN were also planned to be migrated to VSAT TCP/IP.
2. The meeting noted that the migration to TDCF was closely associated with the version of message switch, and that the RTHs use the MESSIR-Com with redundant systems in backup.
3. The MSG Eumetcast are an essential aid to getting data to all African centres. SADIS receiving stations and decoding is available at all ASECNA stations.
4. The Internet is being utilised, mainly from Dakar and centres it supports as well as for back up to the Toulouse link. The VPN over the Internet on GSM is being utilised for national collection in Senegal.

## Brazil

1. Mr José Mauro REZENDE introduced the status report ([Doc20](http://wis.wmo.int/doc%3D3043)) for Brazil. The meeting noted that GISC Brasilia is semi operational and working on establishing a connection to the WIS core network on the RMDCN. Once done this will replace the physical point to point connection to Washington. The current VPN/Internet based RA III RMTN will be Brasilia’s AMDCN and is expected to continue in this form for the time being. They noted the staffing issues are also being addressed.
2. Mr Rezende also presented some ideas and led a discussion on how to represent the networks in WIS, in particular, utilising Weather Map. This issue was discussed further under [agenda item 5](#_5._ANY_OTHER).

## China

1. Mr Lang HONGLIANG introduced the status report (Doc14) for China, and in particular the communication systems utilised by CMA. The meeting noted the role of CMACast and the Internet in distribution of data and products from CMA. It noted the progress on IPv6 and Multicast, including that CMA were conducting a provincial project based on dissemination of data based on multicast and looked forward to future reports on the project.
2. Mr HONLIANG also reported on the status of WIS in China ([Doc 14 powerpoint](http://wis.wmo.int/doc%3D3005)). The meeting noted GISC Beijing was presently supporting five internal DCPCs and six external NC/DCPCs within its area of responsibility.

## France

1. Mr Erwan FAVENNEC introduced the status report for Météo-France (Doc15). The meeting noted Meteo-France has a high availability level on both its RMDCN-NG and Internet accesses. The recent increase in the RMDCN-NG bandwidth, from 10 Mbps to 50 Mbps, is sufficient for their current needs. The Internet access bandwidth should increase shortly.
2. Météo-France is part of IPv6 and multicast experiments but does not have any plan for upcoming internal use.
3. As for the GISC Toulouse, DCPC Odyssey radar is under implementation and vGISC, proposes through internet, utilising a web portal for metadata management. This service is offered for NC’s and DCPC of vGISC area of responsibility.

## Germany

1. Ms Ilona GLASSER introduced the status report for Germany ([Doc05](http://wis.wmo.int/doc%3D3043)). The meeting noted WIS centre Offenbach has established all circuits in its Area of Responsibility, most of them via the RMDCN. A few of the connections are established using the Internet. The standard data transfer method is now FTP/HTTPs. GISC Offenbach has also established circuits to all operational GISCs, and has invited GISC USA and GISC Morocco to establish the circuits as well.
2. GISC backup procedures have been set up for both GISC Moscow and GISC Tokyo. All data intended for global exchange are available via a closed user group on an Internet FTP server (EC 65 request).

## Japan

1. Mr Yoritsugi OHNO and Mr Kentaro TSUBOI introduced the status report for Japan ([Doc 10r1](http://wis.wmo.int/doc%3D3057)). The meeting noted GISC Tokyo connected to the RMDCN NG in February and were now arranging associated links with other GISCs. The meeting also noted that JMA planned to established a Disaster Recovery Site in Osaka in 2015.
2. The meeting noted that Seoul and Tokyo are planning to upgrade the link between them by using the RMDCN NG in replacement of the dedicated circuit.

## Korea, republic of

1. Mr Sungsoo Do introduced status report for GISC Seoul (Doc17). The meeting noted that GISC Seoul provides DAR service through research network for public internet. GISC Seoul completed migration in January 2014 to RMDCN-NG, upgrading 2Mbps to 4Mbps. KMA is deploying IPv6 infrastructure in cooperation with network service provider and will be able to join the initiative as a new participant.
2. The meeting noted that a major concern for KMA is that GISCs still have difficulty in exchanging Cache data in terms of effectiveness and efficiency even though all GISCs are supposed to provide data from their AMDCN for other GISCs to include in their Cache as defined in the manual on WIS. GISC Seoul requests that appropriate method for exchanging globally distributed data should be identified and acted on so that all operational GISCs can meet their Cache commitments.
3. GISC Seoul advised the meeting that they have a new set of satellite data that they want to make available to all GISCs via the GTS.

## Russia

1. The secretariat introduced status report (Doc13r1) from Russia. The meeting noted that the document outlined the activities from GISC Moscow ([http://gisc.mecom.ru](http://wis.wmo.int/doc%3D3039)), implementation for which started in 2011 and was completed in December 2012. GISC Moscow was successfully audited in March 2013. Governmental order for official operational status of GISC Moscow in Russia was signed in the January 2014. The meeting further noted that the report contained important information on the connectivity in GISC Moscow’s AMDCN including access speeds and types of technology.
2. The meeting noted that the report identified details of GISC backup arrangements and connectivity with other GISCs, including being backup for GISC Offenbach’s AMDCN centres in which were now sending data available for global exchange to Moscow, and that Moscow was establishing accounts for those centres so they can subscribe to data. It noted that Moscow was liaising with Toulouse in order for GISC Toulouse to provide backup for GISC Moscow.

## UK

1. Mr David REGAN introduced their status report (Doc16) for WIS centres in the UK. The report includes details of links and circuits for the UK, along with current bandwidth availability and usage. The meeting noted that Met Office has a high availability connection to RMDCN-NG. The 20Mbps bandwidth is sufficient for current traffic loads and can be easily upgraded as it is provided on a 100Mb flex circuit.
2. Internet access is also fully resilient and was upgraded in May 2013 to 1Gbps. It is adequate for current usage.
3. The Met Office’s link to JANET, the UK academic network, is being upgraded to 10Gb. Options are being investigated on how to best use this link can be utilised given certain restrictions on its use.

## Proposal for update to filenaming conventions

1. Mr Erwan FAVENNEC introduced a proposal submitted by Mr Benjamin SACLIER of Meteo-France ([Doc06](http://wis.wmo.int/doc%3D3097)). The meeting agreed in principle with the inclusion of file extensions “.7z” and “.xz” which are popular compressed archive formats, but not presently available in the GTS Manual (Attachment II-15 for general file naming conventions). The meeting also agreed with the proposal to include an extension indicating files that contain several files where each has a valid GTS filename. The proposed extension is “xmwo” that will precede the file type (e.g. .xwmo.bin). Use of such an extension will allow GISCs to easily unpack files for feeding distribution and subscription services.
2. The meeting also noted the proposal to remove the extension .z which is no longer efficient nor adequate.
3. ET-CTS, noting that GTS Filenaming and AHLs are now managed by IPET-DRMM, agreed on the following plan:
* each ET-CTS expert will consult internally with their WIS Focal Point and will report back to the Chair
* the Chair will then prepare a consolidated view and will submit the paper and comments to IPET-DRMM for consideration

# 3. Review of the actions

## 3.1. CTS/a/1 - WMO IPv6 initiative

1. Mr Oliver GORWITS presented Doc07r1 providing a status report on the IPv6 initiative. The objectives of the IPv6 initiative are to enable IPv6 at WIS centres for WIS/GTS related exchanges, in particular, a rolling assessment of IPv6 capabilities of WMO Members, a capacity building strategy, update of technical regulations if necessary, and a pilot project for IPv6 based data exchange of meteorological data until 2016.
2. The IPv6 initiative consists of six main components: an assessment of current situation, a Review of WMO regulatory material, the Provision of guidance material, Raising of Members’ awareness of IPv6, the IPv6 Pilot, and reporting to ET-CTS and CBS.
3. The main parts of the project are the IPv6 pilot project, the IPv6 capabilities assessment and the development of a capacity development strategy as well as the Provision of guidance material. The update of the regulatory material is expected to be trivial, as references to IPv4 can be updated or amended with IPv6 ones.
4. The first 2 years of the project have shown that a continued assessment of IPv6 requirements in the meteorological community is required. What is more, WMO Members are only starting to acquaint themselves with IPv6, as concrete operational IPv6 projects are not currently being implemented and the global context of IPv6 is one of uncertainty despite government efforts for IPv6 readiness.
5. Mr Gorwits also presented Doc04 using a [Power Point presentation](http://wis.wmo.int/doc%3D3059) providing the results of the IPv6 survey. The meeting noted the results of the questionnaire and considered that it provided a very useful source of information. As planned the questionnaire should be reissued and a particular focus should be given to Regional Associations that would most benefit of the adoption of IPv6. The questionnaire also shows that IPv6 isn’t in the priority of many and, even if a majority plans to use IPv6 in the future, there is in general neither definite timeline nor project in place.
6. The chair noted that Mr Timo Pröscholdt (WIS JPO) had played a very important role as the IPv6 project leader and expressed his and the IPv6 Initiative task team’s appreciation. As Mr Pröscholdt has now left the WIS project office, it was agreed that Mr Gorwits would take over the IPv6 project leader role.
7. The meeting reviewed some of the potential activities under the IPv6 project and agreed that the IPv6 project should not spend time compiling a training guide, and instead should identify a starting resource to recommend to IPv6 implementers. Guidance on IT continuity is also important. The project should provide a few use cases, noting that if ET-CTS do not tell Members how to use IPv6, then many will not use it.
8. The meeting reviewed the questions of the IPv6 survey for reissue to benchmark progress of Members. The meeting agreed it should continue to be in English. It suggested that current manuals and guides for WIS and the GTS may need to be updated in the future, including the point mentioned above about establishing reference use or business cases.
9. The meeting agreed that the pilot should continue and be extended. Peter Silva, Sungsoo Do and Erwin Favennec will address the business cases, while Ilona Glaser, Erwan Favennec, UK, Peter Silva and Geoffrey Molloy will address security aspects. As noted above, Oliver Gorwits will be the project manager.
10. Mr Gorwits summarized the ET-CTS discussions on IPv6 as follows:
* The Pilot network has been useful to gain knowledge of the issues surrounding commissioning of IPv6 Internet connectivity. However there remains no clear business case for operational deployment of IPv6 and this is likely to be the reason for bilateral data transfer on the Pilot having little or no uptake.
* Taking into account other components of the IPv6 Initiative yet to be worked on, it is proposed to continue the Pilot network in its current form only (basic network connectivity), welcoming new Pilot participants in 2014, and then direct other effort within the Initiative to documentation review and production. Members of ET-CTS will support the Initiative through work on:
	1. The IPv6 Survey, which has been reviewed, and will be re-issued once more early 2015, in time to report at ET-CTS 2016
	2. Establishing a draft business case
	3. Reviewing the Guide to Information Technology Security (WMO doc No. 1115)

## 3.2. CTS/a/2 - Multicast for the GISC

1. Mr Geoffery MOLLOY reported on the progress and outcome of the work being done on evaluating multicast (Doc12). The meeting noted that documentation on investigations of both UFTP and Tellicast (used by EUMETSAT) have been reviewed, no other software has been proposed as yet for Multicast data distribution and, no decision on Tellicast or UFTP has been made. The team working on assessing multicast for WIS did not believe that the WIS core network and its users were ready for Multicast at this time.
2. The meeting noted that EUMETSAT is planning to use Tellicast on a terrestrial network (GEANT). EUMETSAT will continue to report on its experience on Tellicast to ET-CTS and agreed to include in further study the GISC data interchange component
3. ET-CTS agreed to put on hold multicast development until the structure of future interchange of data between GISCs has been finalized.
4. The meeting agreed that once GISC data interchange solutions are finalized, it would be more timely to begin assessment of viability followed by design proposals as required, including:
* Selection of multicast routing protocol options, multicast addressing, and other multicast options for RMDCN.
* Begin examination of File transfer applications including costs of using Tellicast software and determine affordability as compared to an Open Source UFTP implementation and any other systems that can be sourced
1. Depending on whether the viability of multicast has been determined for GISC data interchange, it will then be necessary to develop a detailed implementation plan on the basis of these investigations
2. The meeting agreed to continue with the Task Team on Multicast for the GISC. This group is led by Mr Geoffrey Molloy with representatives from Germany and EUMETSAT. The Task Team will keep abreast with new development on Multicast and potential new software solutions. It is not envisaged to conduct further tests before the next ET-CTS meeting in 2016

## 3.3. CTS/a/3 - Design principles for the WIS data communication structure

1. The secretariat presented ([Doc22](http://wis.wmo.int/doc%3D3029)) and the meeting reviewed the basic requirements of GISC to GISC communications in Tech Reg 49[[6]](#footnote-6), the Manual on the GTS (WMO No 386)[[7]](#footnote-7) and the Manual on the WIS (WMO No 1060)[[8]](#footnote-8).

**Possible architecture for cache synchronization and metadata exchange.**

1. The chair presented a possible architecture for cache synchronization and metadata exchange between GISCs ([Doc02r2](http://wis.wmo.int/doc%3D2841)). The meeting noted that the basic requirement is that all WMO members have the information from the global community necessary to provide their critical operational meteorological and related services. A corollary of this is that members have to make available agreed information they collect/produce to other members (basis of Res 40) within the agreed time frames.
2. This is reflected in the roles identified for the GISCs which are a core hub in communications between GISC AMDCN’s. From a telecommunications perspective, the two basic requirements are for the GISC to:
* Collect information intended for global dissemination from their area of responsibility via their AMDCN and **send to other GISCs**;
* **Receive information** intended for global dissemination or distribution to their AMDCN **from other GISCs** and disseminate to centres within their area of responsibility via their AMDCN.

**Required data exchange only between the GISCs.**

1. The meeting recalled that the present architecture requires GISCs to send information to all other GISCs via a fully meshed network. Instead of creating a fully meshed traffic flow between all the GISCs, the ET-CTS noted that the proposal to consider the use of a cloud service to simplify the communication structure between the GISCs.
2. Noting that TT-GISC had also considered this proposal the meeting agreed that further analysis is required to make sure that the service level offered by such an architecture is consistent with the level of SLA required to the GISCs and is legally acceptable by all GISCs. Considering that the RMDCN is the operational network between the GISCs, connecting the cloud provider on the RMDCN is therefore required in order to guarantee the timeliness of the data exchange. ET-CTS noted that among the various cloud providers, Interoute, the provider of the RMDCN Next Generation, is potentially an attractive solution. Interoute propose the “Virtual Data Centre” (VDC) service. Their data centres are connected on their MPLS backbone, thus allowing the connectivity between the VDC and the RMDCN (and the Internet) at no additional cost.

**EUMETSAT perspective on inter GISC communication**

1. Mr Colum GRANT presented a EUMETSAT approach to GISCs sharing data to populate their 24 hour cache (Doc19). He suggested that this should be approached in a layer model: Data exchange model/architecture layer; Applications layer; Protocol layer; and Transport layer.
2. He recalled that some of the potential architecture topologies that have been considered are: N-point to point; Decentralised meshed; Broadcast; Torrent; Data shared (e.g. clouds); and Unidirectional/multi-directional exchange strategies. Protocols included: ftp; http; multicast; OAI-PMH; BitTorrent; etc.
3. An analysis of the pros and cons for each of the above should be carried out, and a market or software survey conducted. Ideally, specifications could be defined, and then some GISCs could partner to prototype the promising solutions. In this way, ET-CTS could then provide informed advice to CBS on how best to share data in order to meet the requirement of WIS for a 24 hour cache in GISCs.
4. The meeting noted such an approach was certainly ideal, and further appreciated EUMETSAT’s willingness to share their expertise and to participate.

**Distribution among GISCs via HTTP/AMQP**

1. Mr Peter SILVA briefed the meeting on technique used in Canada’s Datamart ([Doc18](http://wis.wmo.int/doc%3D3069)) to manage data subscriptions by generating a small alert message whenever data or products are received, which is sent to subscribers so they can collect the data or product. It is based on Advanced Message Queuing Protocol 0.9 (AMPQ). Details of this system and optional configurations are included in the document.
2. The meeting noted the recommendation that, noting the use of cloud systems above ([Doc02r2](http://wis.wmo.int/doc%3D3111)), the proposed solution could be used by GISCs to alert subscribers to the availability of new data or products in the “GISC Cloud” or some other approach to the same effect. The document also included details on how to maintain directory structures for facilitating data access and other services.
3. ET-CTS thanked Canada for their offer to support a pilot investigation into use of AMQP for GISC information exchange, and subscription services. It recommends that GISCs consider participating in a trial of proposed HTTP/AMQP using the existing Canadian implementation to gain experience with the technology for future evaluation.
4. The meeting noted the report from Germany ([Doc11](http://wis.wmo.int/doc%3D3075)) presented by Ms Ilona Glaser. It agreed that every GISC establishing 14 bilateral links is very difficult, but that an effective short term solution is that GISCs form bilateral agreements and establish links to the extent possible and arrange to exchange data accordingly to meet their 24 hour cache commitment. ET-CTS suggested that GISCs should further investigate the usage of Internet ftp/http(s) servers for this purpose and to share their findings with ET-CTS.

**Conclusion**

1. Having discussed the current options the meeting agreed that the current aim for a full mesh core network of WIS using ftp will not be a sustainable and scalable solution and that no ideal solution exists at this time. It agreed that GISCs should continue working towards bilaterally agreed links as an interim solution, approaching as fully meshed as possible. Noting that the long-term solutions on the table at present are multicast, cloud and partially meshed. As agreed above, the study of multicast should wait for the time being. ET-CTS then agreed to pilot the cloud solution (leader: ECMWF, members UK, Germany, France, Korea) and to undertake a study of the partially meshed solution (leader Canada, members Australia, Germany, EUMETSAT). The pilot on the cloud solution will be led by ECMWF, voluntary GISCs will be sought after late 2014/early 2015.

## 3.4. CTS/a/4 - Pilot revision of WMO No. 386, Vol II, sections B.I-1 to B.I-15

1. The meeting noted that no progress has been made on the matter.

## 3.5. CTS/a/5 - Contribute to the development of WIS educational requirements and capacity building led by ET-WISC

1. The meeting reviewed the outcome of the WIS Curriculum Workshop ([Info05](http://wis.wmo.int/doc%3D3077)) held in Geneva from 1 to 4 October 2013. It noted that many of the competencies associated with telecommunications and infrastructure are industry standard with training readily available. It endorsed the outcome of the workshop and made some minor recommendations to improve the documents by consistently including backup and recovery across the competencies and learning guide. Recommended changes are available in track changes from [http://wis.wmo.int/doc=3077](http://wis.wmo.int/doc%3D3087) for WIS competencies, and [http://wis.wmo.int/doc=3079](http://wis.wmo.int/doc%3D3081) for the learning guide.

## 3.6. CTS/a/6 - Contribute to the development of WIS monitoring requirements led by ET-WISC

1. The meeting reviewed the outcome of the WIS Monitoring Workshop ([Info06](http://wis.wmo.int/doc%3D3071)) held in Geneva from 21-24 January 2014. The chair clarified several elements of the workshop report ([http://wis.wmo.int/file=695](http://wis.wmo.int/doc%3D3105)), highlighting the important role the telecommunications and infrastructure will play in implementation of the monitoring, both in real-time and for reporting and planning purposes.
2. The meeting noted the timeline for review of the monitoring included a review of the document by ET-WISC prior to submission to ICT-ISS around June prior to review by CBS (Ext 2014) in September. It noted further that a pilot is planned later in 2014 to test the practices and principles which will involve some ET-CTS members. Although not keen on the tight timelines for the pilot, the meeting endorsed the report. It suggested any additional feedback should go to ET-WISC or made known to the ET-CTS chair prior to ICT-ISS.

## 3.7. CTS/a/7 - Development and maintenance of WIS core network

3.7.1. Report on the situation of the RMDCN Next Generation

1. Mr Oliver GORWITS briefed the meeting ([Doc09](http://wis.wmo.int/gts-vpn)) on the progress of the migration to the RMCN Next Generation (RMDCN NG). The meeting recalled that the Project Definition and Objectives were to “realise the migration of the RMDCN network from the current provider (OBS) to the new provider (Interoute) … without a break in operational service to the currently connected user sites. The scope of the project was to migrate as many of the currently connected sites as possible and to connect as many GISCs as possible.”
2. The meeting noted that the migration had gone very well and that only one RMDCN User Site remained on the OBS network (with ECMWF acting as a gateway), and it is expected that this site will soon cut-over to the new service. Therefore the project objectives will have been successfully achieved with only minor deviations from the planned schedule.
3. ET-CTS thanked ECMWF for their contribution and a well-managed project. It made special mention of the contribution by the RMDCN team at ECMWF over several years to this project, from initial market surveys through tender evaluation, contract negotiation, and migration: Tony Bakker; Ahmed Benallegue; Remy Giraud; Oliver Gorwits and Alan Radford.
4. ET-CTS noted that as the core network of WIS, it is essential that all GISCs be connected to the RMDCN NG. It noted in particular that GISC Brasilia, GISC Tehran and GISC Jeddah had all still to be connected if they are to comply with the manual on WIS. Participants noted that the RMDCN NG project team, Interoute and the secretariat were working with these GISCs to assist them in connecting.

## 3.8. CTS/a/8 - Develop a coordination mechanism for users and suppliers of satellite data collection systems (Satcom)

1. The meeting noted the report of Mr Colum GRANT ([Doc03r1](http://wis.wmo.int/doc%3D3119)) and referred to the terms of reference provided in the Satcom report to EC-PORS ([Inf03](http://wis.wmo.int/doc%3D3111)). The chair thanked Mr Grant for his extensive effort and research that was evident in this report, which provided essential background to the meeting. It reviewed the TOR for ET-CTS and agreed that, under the general OPAG-ISS and its ETs’ TORs, this Expert Team is the best placed group to support this activity.
2. It noted that only a few participants had direct experience in DCS (Data Collection Systems) issues and for those, the real expertise was with other colleagues in their organizations. It agreed that a sub team or task group could be established in ET-CTS but it would need to draw on these fellow experts who would need to be invited to be associate members of ET-CTS in order to be members of the task team. If it is agreed to establish the Satcom Forum, it will be necessary to define TORs for such a task team, and identify relevant experts to be members.
3. The TORs of such a Task Team should make it clear that ET-CTS will be providing technical expertise on issues related to DCS communications and technology. It would also include the requirement to escalate to other OPAG ISS teams any issues that come from the Forum, such as data format changes, discovery metadata and so on. It is expected that at least one representative of ET-CTS task team would participate in the forum activities.

# 4. WIS plan and roadmap

## 4.1. Review term of reference of ET-CTS under WIS

1. The meeting noted the TOR (See [Annex 4](#_Annex_4_–)) for ET-CTS in light of the introductory presentation by the secretariat and the CTS work plan addressed under agenda item 3 ([Review of actions](#_3._Review_of)) above. Continued maintenance of guidance and regulatory material remains a critical activity as Members are starting to plan their own WIS implementations. The meeting also noted that ET-CTS’s contribution will be important in the development of WIS Competencies and Learning Guides described in [Info05](http://wis.wmo.int/doc%3D3085) (Outcome of WIS Curriculum workshop ) even though many of the basic professional skills associated with ET-CTS activity will be from normal tertiary and industry training. Some specialist knowledge and competencies will still be needed relative to WMO operating environment. The meeting noted that WIS monitoring will also be important for the telecommunications infrastructure, so ET-CTS should continue to be involved in development of WIS monitoring as described in Info06 (Outcome of WIS Monitoring workshop). The meeting noted that the maintenance of GTS Abbreviated Header Lines (AHL) and GTS File Naming Convention had been passed to the Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM).
2. The meeting noted that the TORs allowed the potential new role of SATCOM discussed under item 3.8 ([CTS/A/8](#_3.8._CTS/a/8_-)), however, it emphasised that this specialist expertise would need to be added to ET-CTS membership if SATCOM proceeds.
3. The meeting concluded that no changes were required at this time to the ET-CTS TORs.

## 4.2. Report on outcomes of Cg, EC and other ETs

1. No documents were specifically allocated to this item which was covered in the introductory overview of WIS by the secretariat during the first session ([Organization of the meeting](#_1._Organisation_of)).

# 5. ANY OTHER BUSINESS

**Review of technical regulations and guides**

1. The meeting reviewed the “Guide to Information Technology Security (WMO No. 1115)” ([Info07](http://wis.wmo.int/gts-security%22%20%5Ct%20%22_blank)) and the “Guide to Virtual Private Networks (VPN) via the Internet between GTS centres (WMO No. 1116)” (Info08). It noted that both are current and agreed that ET-CTS members should provide any recommended changes to Ms Ilona GLASER for future updates.

**Links database, content and presentation of data**

1. The meeting recalled the need to present each country’s WIS communication links as well, line capacity, end points and communication protocol. It noted the progress on the WMO Country Profile Database project (http://www.wmo.int/cpdb/) which aims to allow Members to review information about their country and to update it via a registered user process. A sample of the CPDB WIS entries for France is provided in [Annex 7](#_Annex_7_–) (taken from meeting working document “WIS Links”.) This data is populated from the secretariat working databases which are maintained within the WIS office by C/ITS and C/DRMM and already dynamically updating the WIS web pages as well as supporting the WIS Wiki.
2. ET-CTS agreed that maintaining WIS centre and links information via the web is more practical than the past practice of publishing the data in the Manual on GTS, Volume II, which they noted has not been updated in many years.
3. The meeting agreed that the reportable content of a database on WIS links should be integrated with other centre information, and that each centre should be able to see what links it has, with their classification aligning with the Manual on GTS definition of links where B2 is a standard operational WIS circuit agreed bilaterally between centres and B4 is a standard operational GTS circuit agreed by the Regional Association.

*Principle 2 (*[*http://wis.wmo.int/gts-manual*](http://wis.wmo.int/doc%3D3115) *Page 2)*

The system shall comprise an integrated network of point-to-point circuits, point -to-multipoint

circuits, broadcast and multipoint-to-point circuits which are reliable and have suitable

technical and operational characteristics. These circuits may be established via a combination

of terrestrial and satellite telecommunication links, and data-communication network services.

Notes:

1. In this Manual, the word circuit is traditionally understood to represent a physical link between two Centres, but in

today’s modern telecommunication systems could also be understood to represent a logical stream of data

between two Centres that are interconnected using a network. In this latter situation, several circuits could be

implemented from a given Centre over a single physical connection to a network.

2. A GTS circuit is a specialized form of a WMO Information System (WIS) circuit and, for convenience, the status of

any WIS link between WIS Centres may be recorded as being in one of four states:

B1 – Negotiating

B2 – Circuit operational

B3 – Pending GTS status

B4 – GTS circuit.

1. In addition to the link status, Members should be able to see the: links start and end places; link type (e.g. MPLS, VPN over the Internet, Point to Point, DVB, V27 etc); bandwidth; and for each link, Members should be able to see what circuits are operating over it. That is, each circuit could have a Centre ID, a link ID, a circuit ID. For example if: Offenbach is OF, its RMDCN link is 01, and it is the circuit to Eumetsat is “b”, then the circuit overall ID would be “OF 01 b” in three columns. Being a GTS circuit, the state of the circuit would be B4 as per the above extract from the 2013 update of the Manual on GTS (2011) – WMO No 386.
2. The meeting also noted that it would be beneficial to have standard set of traffic types such as included in the Russian Status Report ([Doc13r1](http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-index.php)) table of circuits.
3. Noting Brazil’s report ([Doc20](http://wis.wmo.int/doc%3D2841)) suggesting to look for a common way or method to represent the diagram of connections in WIS (Spaghetti Diagrams), ET-CTS also reviewed presentation used in Manual on GTS Vol II and in the various status reports and the working document. It agreed that it would be more effective if these were generated from the database and available in a range of styles to suit different purposes, including creating the tables of link details shown in most reports. It asked the secretariat to continue the development of the database approach to facilitate monitoring and reporting on the status of WIS networks. Oliver Gorwits and José Mauro Rezende offered to assist the secretariat in this work.

# 6. Meeting Close

1. The chair noted the high level of participation at this meeting and thanked everyone for their contribution. He noted that he will organize regular webex to follow up on progress of activities and encouraged members to consider hosting the next meeting, as he had found holding this meeting in Brasilia to be very beneficial for encouraging participation as well as allowing the team to get to know the operations and staff in Brasilia. He thanked INMET for hosting the meeting and for their support during the meeting.
2. He wished all a safe journey home and closed the meeting.

# Annex 1 – Agenda

1. **ORGANISATION OF THE MEETING**
	1. Opening of the meeting
	2. Adoption of the agenda
	3. Working arrangements
2. **REVIEW OF THE CURRENT STATUS OF IMPLEMENTATION OF TCP/IP PROCEDURES AND APPLICATIONS AT WIS CENTRES**

Note: To avoid having all the presentation at the same moment, the presentations will be spread over the 4 days (Please limit your presentation to 15’ maximum).

1. **REVIEW OF THE ACTIONS**
	1. CTS/a/1 WMO IPv6 Initiative
		1. Progress report of the adoption of IPv6 in each WIS Center
		2. Progress report on the WMO IPv6 initiative
			1. Current status of the test environment
			2. Results of the IPv6 Survey
			3. Open discussion on the next steps
	2. CTS/a/2 Multicast for the GISC
		1. Report from EUMETSAT on Multicast
		2. Update on the multicast
		3. Open discussion on the next steps
	3. CTS/a/3 Design principles for the WIS data communication structure
		1. Possible architecture for cache synchronization and metadata exchange between GISCs
	4. CTS/a/4 Pilot revision of WMO No. 386, Vol II, sections B.I-1 to B.I-15
	5. CTS/a/5 Contribute to the development of WIS educational requirements an capacity building led by ET-WISC
		1. Report on the WIS Training Workshop
		2. Open discussion on the report and input from the participants
	6. CTS/a/6 Contribute to the development of WIS monitoring requirements led by ET-WISC
		1. Report on the WIS Monitoring Workshop
		2. Open discussion on the report and input from the participants
	7. CTS/a/7 Development and maintenance of WIS Core Network
		1. Report on the situation of the RMDCN Next Generation
	8. CTS/a/8 Develop a coordination mechanism for users and suppliers of satellite data collection systems (Satcom)
2. **WIS PLAN AND ROADMAP**
	1. Review term of reference of ET-CTS under WIS
	2. Report on outcomes of Cg, EC and other ETs (Secretariat)
3. **ANY OTHER BUSINESS**

# Annex 2 – Document List

***Information Documents***

* Info01 - Information for participants
* [Info02](http://wis.wmo.int/gts-security) - List of Participants
* [Info03](http://wis.wmo.int/doc%3D2853) - Submission to EC-PORS on SATCOM
* [Info04](http://wis.wmo.int/doc%3D3069?page=ET-CTS-2014-DocPln) - Document allocation plan
* [Info05](http://wis.wmo.int/doc%3D3089) - Outcome of WIS Curriculum workshop (TT-GISC Doc 5)
* [Info06](http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-index.php) - Outcome of WIS Monitoring workshop (TT-GISC Doc 6)
* [Info07](http://wis.wmo.int/doc%3D3029) - Guide to Information Technology Security (WMO No. 1115)
* [Info08](http://wis.wmo.int/gts-manual) - Guide to Virtual Private Networks (VPN) via the Internet between GTS centres (WMO No. 1116)
* [Info09r2](http://wis.wmo.int/doc%3D3085) - Meeting Work Plan

***Documents***

* [Doc 01r1](http://wis.wmo.int/doc%3D3019) - Draft Agenda
* [Doc 02r2](http://www.wmo.int/cpdb/)- Possible architecture for cache synchronization and metadata exchange between GISCs
* [Doc 03r1](http://wis.wmo.int/doc%3D3067) - Report on a coordination mechanism for users and suppliers of satellite data collection systems (Satcom)
* Doc 04 - [PPT](http://wis.wmo.int/doc%3D3061) IPv6 Initiative Status Report
* Doc 05 - Germany - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* Doc 06 - Proposal to update ATT. II-15 for general file naming convention
* [Doc 07r1](http://wis.wmo.int/doc%3D3005) - IPv6 Initiative Status Report
* Doc 08 - ECMWF - Review of the current status of TCP/IP procedures and applications at WIS centres (item 2)
* Doc 09r1 -  [PPT](http://wis.wmo.int/doc%3D3067)- Report on the RMDCN Next Generation (item 3.7)
* Doc 10r1 -  [PPT](http://wis.wmo.int/doc%3D3083)- Japan- Review of the current status of TCP/IP procedures and applications at WIS centres (item 2)
* Doc 11 - Germany-proposal-for-discussion (item 3.3.1)
* Doc 12 - Update on Multicast for the GISC communications (item 3.2.2)
* [Doc 13r1](http://dcpc.smn.gov.ar) - Russia - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* [Doc 14](http://wis.wmo.int/doc%3D3025) -  [PPT](http://wis.wmo.int/doc%3D3077)- China - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* [Doc 15](http://wis.wmo.int/doc%3D3119) - France - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* Doc 16 - UK - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* [Doc 17](http://wis.wmo.int/doc%3D3087) - Korea - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* Doc xxa - WIS Competencies (CTS updated)
* [Doc xxb](http://wis.wmo.int/doc%3D3117) - WIS Training and learning Guide (CTS updated)
* [Doc 18](http://wis.wmo.int/doc%3D3103) - HTTP-AMQP Distribution Trial (Item 3.3)
* [Doc 19](http://wis.wmo.int/doc%3D2841) - EUMETSAT perspective on GISC to GISC exchange (Item 3.3)
* [Doc 20](http://wis.wmo.int/doc%3D3071) - Brazil - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* [Doc 21](http://wis.wmo.int/doc%3D3019) - Australia - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* Doc 22 - Extracts from Tech Regs (Item 3.3)
* [Doc 23](http://wis.wmo.int/doc%3D3101) - Argentina - Review of the current status of TCP/IP procedures and applications at WIS centres (Item 2)
* Doc 24 - ASECNA - review of Man on GTS Vol II for RA I (French)
* Doc 25 - ASECNA - Status Report (Item 2)

# Annex 3 – List of participants

***Participants***

|  |  |
| --- | --- |
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| Japan | Yoritsugi OHNO, Kentaro TSUBOI |
| Korea,Rep of | Sungsoo DO |
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# Annex 4 – ET-CTS TORs

**Terms of Reference for Expert Team on Telecommunications Infrastructure (ET-CTS)**

|  |  |
| --- | --- |
| (a) | Maintain and develop recommended practices and technical guidance material for data communication techniques and procedures for use in the WIS, with a view to ensuring efficient and safe operations of information systems, and inform members of recent developments in standards bodies, in particular ITU and ISO; |
| (b) | Review and further develop the organization and design principles for the WIS data communication and access structure, and coordinate related pilot and implementation projects; |
| (c) | Review and amend as required the telecommunications components of the Manual on WIS (WMO-No 1060), the Manual on the GTS (WMO-No 386), their associated Guides and other guidance material; |
| (d) | Provide guidance on the technical, operational, administrative and contractual aspects of data communications services for WIS implementation at national, regional and global levels, including among others satellite telecommunications, managed data communications network services and the Internet and co-ordinating cooperation with other organizations where appropriate to obtain operational benefits; |
| (e) | Review and further develop guidance and practices for planning, implementation and operation of data collection systems for observing systems for NMHSs, including interfaces with observation platforms, methods and data communications protocols; |
| (f) | Monitor the effectiveness of data exchange on the WIS in relation to the expected standards, and take follow-up action, including capacity-building activities, to address issues identified; |
| (g) | Facilitate the interaction between Members and International Organizations on telecommunications issues, including ensuring remote communities and areas with limited access to modern communication systems are properly catered for; |
| (h) | Advise the technical commissions on data communications issues, especially in respect of the WIS; |
| (i) | Identify implementation issues requiring the urgent consideration of the OPAG on ISS. |

# Annex 5 – ET-CTS Membership

**Expert Team on Telecommunications Infrastructure (ET-CTS)**

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# Annex 6 - Decision Summary

Decision 1: Review the IPv6 questionnaire in order to re-publish the questionnaire early 2015

Decision 2: The IPv6 task is split in three sub-tasks:

* + Continue and extend the Pilot (Lead ECMWF)
	+ Development of business cases (Lead Canada, members Korea, France and Japan)
	+ Investigate security aspects aiming at including specific IPv6 security aspects in WMO document 1115 (“Guide on IT Security”)

Decision 3: With regard to the GISC data architecture:

* + Postpone further technical investigation on Multicast for GISC data interchange
	+ Set-up a cloud-based pilot environment for the GISC data interchange (Lead ECMWF, members UK, Germany, France, Korea) including the use of Advanced Message Queuing Protocol as proposed by Canada
	+ Investigate the possibility of assuring the completeness of the 24h cache in a partially meshed network (leader Canada, members Australia, Germany, EUMETSAT)

Decision 4: Before submitting to IPET-DRMM a proposal to update the filenaming convention:

* + each ET-CTS expert will consult internally with their WIS Focal Point and will report back to the Chair
	+ the Chair will then prepare a consolidated view and will submit the paper and comments to IPET-DRMM for consideration

Decision 5: In order to update the “Guide on IT security” (WMO publication 1115), and in particular to include IPv6 related material, Germany will consolidate input from experts. Further changes to this guide need to be endorsed by CBS.

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# Annex 7 – Country Profile Database view of WIS



1. Manual on WIS (WMO No 1060) – <http://wis.wmo.int/wis-manual> [↑](#footnote-ref-1)
2. Guide to WIS (WMO No 1061) – <http://wis.wmo.int/wis-guide> [↑](#footnote-ref-2)
3. Manual on GTS (WMO No 386) – <http://wis.wmo.int/wis-manual> [↑](#footnote-ref-3)
4. “Guide on IT Security” (WMO No 1115) – <http://wis.wmo.int/gts-security> [↑](#footnote-ref-4)
5. “Guide on VPN via the Internet between GTS centres” (WMO No 1116) – <http://wis.wmo.int/gts-vpn> [↑](#footnote-ref-5)
6. Technical Regulations, Volume I: General Meteorological Standards and Recommended Practices (WMO no 49) - <http://library.wmo.int/opac/index.php?lvl=notice_display&id=14073> [↑](#footnote-ref-6)
7. Manual on GTS (WMO No 386) <http://wis.wmo.int/gts-manual> [↑](#footnote-ref-7)
8. Manual on WIS (WMO No 1060) <http://wis.wmo.int/wis-manual> [↑](#footnote-ref-8)