

## **EXPECTED RESULT 5**

### **INFORMATION SYSTEMS AND SERVICES (ISS)**

#### **SUMMARY**

**ISSUES TO BE DISCUSSED:**

1. Outcome of the work of the OPAG on ISS
2. Future work programme and tasks

**DECISIONS/ACTIONS REQUIRED:**

- (a) Recommendation and guidance on further development of ISS and the WIS including the GTS;
- (b) Adopt draft Recommendations 6.2/1 (CBS-XIV), 6.2/2 (CBS-XIV) and 6.2/3 (CBS-XIV) (see Doc. 6.2(2)).

**REFERENCES:**

1. Reports of the meetings of the OPAG's Expert Teams since CBS-Ext.(06)
2. Report of the 8th and 9th sessions of the CBS Management Group
3. Abridged Final Reports of Cg-XV, EC-LIX (2007) and EC-LX (2008)

**CONTENT OF DOCUMENT:**

**Appendices for inclusion in the final report:**

- A. Draft text for inclusion in the general summary of CBS-XIV
- B. Draft Recommendation 6.2/4 – Amendments to the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume I, Part II

**Related document for information:**

**CBS-XIV/INF. 6.2(1)**

## **DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF CBS-XIV**

### **6.2 INFORMATION SYSTEMS AND SERVICES (ISS) (agenda item 6.2)**

**6.2.1** The Commission thanked Mr Peiliang Shi, Chairperson of the OPAG, for his report. It noted with satisfaction the progress and achievements made, covering a wide range of tasks. The Commission expressed its thanks to the many experts who had served on the various OPAG's teams.

#### **Status of implementation and operation of the GTS**

**6.2.2** The Main Telecommunication Network (MTN), and especially the Improved MTN, provides a very efficient core communication network. All the 23 MTN circuits were in operation. Eleven MTN circuits were implemented through MPLS data-communication network services (access speed from 128 Kbit/s to 4 Mbit/s), four circuits through Frame Relay (16Kbit/s to 768 Kbit/s), five circuits via leased line (64 Kbit/s and one at 9.6 Kbit/s) and two circuits via VSAT (64 Kbit/s and 19.6 Kbit/s). All MTN circuits (but one) were operating with TCP/IP or had a firm plan for the migration to TCP/IP. The Commission was pleased with the significant progress made in the implementation of IMTN and RMTNs, but it noted that serious shortcomings still existed in some Regions at the regional and national levels.

**6.2.3** In Region I, despite serious economic difficulties, continuous efforts had enabled some improvement of GTS circuits via leased lines, satellite-based telecommunications or public data networks, including the Internet. Satellite-based data-distribution systems (EUMETCast, RETIM-Africa and SADIS) and data-collection systems (METEOSAT/DCS) continue to play a crucial role. There were still serious shortcomings, in particular at the national level. Satellite-based telecommunications was playing a crucial role in the western part of the Region through the ASECNA VSAT network and in the eastern part with the implementation of a VSAT network by RTH Nairobi.

**6.2.4** Most of Region II GTS circuits were operating at medium or high speed, but there were still a few low-speed connections. The RMTN in Region II, particularly in its eastern and southern parts, was being improved by the continued implementation of data communication services, such as MPLS IP-VPN and Frame Relay services, complemented by satellite-based distribution systems (PCVSAT operated by China and MeteorInform by the Russian Federation) and the use of the Internet. Most of the current GTS circuits had been migrated to TCP/IP. Firm plans of telecommunications providers to discontinue Frame Relay services as well as low-speed dedicated circuit services was a serious issue that needed urgent coordination plans. Linkage via the Internet was increasing, and using VPN techniques for ensuring operational security was highly recommended. The Commission noted with appreciation that RTH Jeddah (Saudi Arabia) had started a satellite based dissemination service (DVB-S) with regional coverage.

**6.2.5** In South America, the plan for the actual implementation of the RA III Regional Meteorological Data Communication Network (RMDCN) did not proceed due to administrative and financial constraints in several countries. IP-VPN connection via Internet is being used between some NMCs and RTHs, and comprehensive tests are under way. All 13 NMCs were equipped with receiving systems of the International Satellite Communication System (ISCS) operated by the United States. EUMETCast receiving systems were also installed in most countries of the Region.

**6.2.6** In Region IV, the International Satellite Communication System (ISCS) operated by the USA that was providing for the RMTN as well as data distribution over Regions III and V. This network has been operating well using TCP/IP procedures with an increased capacity.

**6.2.7** Region V RMTN continued using Frame Relay services and satellite-based communications (ISCS). The Emergency Managers Weather Information Network (EMWIN) is also a crucial source of data, warnings and forecasts for the Pacific, in particular for small island countries. The use of Internet had increased considerably, in particular for the collection of observational reports and for linking small nations in the Pacific. The current RANET project and a Pacific HF digital e-mail network were under further development. The cessation of Frame Relay services was also affecting centres in Region V and needed urgent coordinated action.

**6.2.8** The RA VI RMDCN, managed by the ECMWF, initially based on Frame Relay, had migrated in June 2007 to a MPLS IPVPN. The RMDCN interconnects 40 RTHs and NMCs, as well as ECMWF and EUMETSAT sites. The contractual arrangement for the new network continued to be an excellent cost-effective implementation of the GTS, with a very high reliability and full security, a guaranteed quality of service and an easy scalability of capacity. The RMDCN services were extended to include interregional and MTN GTS circuits. The other RA VI Members were operating leased point-to-point GTS circuits and Internet connections and were expected to join the RMDCN when cost-effective. Satellite-based distribution systems based on DVB-S (RETIM, PCVSAT, MeteorInform and EUMETCast/MDD) were also playing an important role.

**6.2.9** The Commission expressed its appreciation for the extensive implementation and significant technological upgrades of satellite-based multipoint telecommunications systems, especially using digital video broadcasting (DVB) or digital audio broadcasting (DAB) techniques, that were operating as integrated components of the GTS for the distribution of large volume of information, in complement to the dedicated connections. Each WMO Region was completely covered by at least one satellite-based data-distribution system, and several systems were implemented at national or sub-regional level.

### **GTS-WIS Communication Structure**

**6.2.10** The Commission recalled that Fifteenth Congress (Cg-XV) emphasized that the WIS implementation should build upon existing WMO information systems in a smooth and evolutionary process, and agreed that the WIS implementation plan has two parts that would be developed in parallel:

- (a) Part A: the continued consolidation and further improvements of the GTS for time-critical and operation-critical data, including its extension to meet operational requirements of all WMO Programmes (including improved management of services); highest priority should be given to overcoming the persisting shortcomings in the current GTS implementation;
- (b) Part B: an extension of the information services through flexible data discovery, access and retrieval services to authorized users, as well as flexible timely delivery services.

**6.2.11** The Commission noted that two concepts had been under consideration for the WIS real-time network structure:

- (a) A Global Meteorological Data Communication Network, consisting of a single coordinated global network based on data-communication network services, resulting from the evolution of parts of the current GTS while integrating other parts;
- (b) Area Meteorological Data Communication Networks (AMDCN), in which each GISG would be responsible for coordinating telecommunication links and data flow in its area of responsibility.

**6.2.12** The Commission agreed that while the concept of a *single* global network was very attractive from the technical view point, the administrative constraints would make it extremely difficult to implement and manage. It requested the OPAG-ISS to consolidate the concept of area networks (AMDCN) coordinated by each GISC, for the WIS real-time network structure.

**6.2.13** The WIS real-time network would be composed of a small number of Area Meteorological Data Communication Networks (AMDCNs) and a WIS core network interconnecting the GISCs and AMDCNs together. Each GISC would create and maintain its AMDCN, and manage traffic between any WIS centre in the AMDCN and any other WIS centre in other AMDCN where the appropriate agreements are in place.

**6.2.14** The Commission endorsed the AMDCNs implementation design principles as follows:

- An AMDCN should be mainly based on a cost-effective network service appropriate for its area of responsibility;
- A GISC should be a control entity of its AMDCN, possibly in cooperation with other GISC(s), for overall technical and administrative management (e.g. traffic, security, monitoring, backup arrangement, competitive procurement, contract, funding coordination);
- New applications taking place of message switching mechanisms should be developed to ensure sophisticated communication without undue delay, especially between any WIS centres within an AMDCN;
- An AMDCN should keep scalability and flexibility to respond to new global and regional requirements, and to keep up with technology development;
- Gateway facilities/functions and guidelines to promote the migration to cost-effective network services should be provided.

**6.2.15** The Commission noted that several issues related to WIS real-time network structure were still requiring further studies, such as:

- The connection of DCPCs and NCs operated by non-NMHSs with GISC;
- Backup solutions for GISCs;
- Role of gateway centres for data exchange between centres under different network conditions in the AMDCNs and for protecting against unauthenticated access from outside of the AMDCNs;
- Administrative hurdles to realize the AMDCNs on a large scale, such as consensus process of all participants, coordinated procurement on one-stop contract procedure, overall operational management scheme and governance.

### ***WIS core network***

**6.2.16** The Commission noted the requirements for all GISCs to synchronize large volume of data and products with their metadata catalogues on a real-time basis through the WIS core network. Therefore indispensable requirements for the core network are predictability and stability in available throughput (bandwidth and network latency), reliability for continuous operation on 24 x 7 basis without interruption and security against malicious attacks such as intrusion, denial of service, tampering, spoofing and snooping.

**6.2.17** To meet such requirements, a closed network services with a definite Service Level Agreement (SLA) would be needed. The public Internet cannot provide this type of service and should not be used in this case. There was a common understanding that the Improved MTN should evolve into the core WIS network.

***Improved MTN project (IMTN)***

**6.2.18** The Commission noted that the Improved MTN project (IMTN) implementation had facilitated a progressive and rapid implementation of effective and reliable data-communication network services for the core GTS services towards the core network for WIS. It expressed its great appreciation for the collaborative and fruitful efforts made by the NMHSs concerned.

**6.2.19** With respect to Network I ("Cloud I"), the Commission noted that it was still using Frame Relay services and that the current contract was due to end in December 2009, requiring a new contractual arrangements. It also noted that RTHs Brasilia and Buenos Aires had not yet joined Network I and were still connected to RTH/WMC Washington via 64 Kbit/s digital leased circuits.

**6.2.20** Network II ("Cloud II") was implemented through the extension of the RA VI-RMDCN managed data-communication services. The ECMWF, in the framework of the WMO-ECMWF agreement, was managing the network and monitoring, on behalf of all participating centres, the quality of service and the contractor's adherence to the Service Level Agreements. The Commission noted with appreciation the successful migration of Network II ("Cloud II") to MPLS-based IPVPN in June 2007, leading to significant improvement in cost-effectiveness for the benefit of the IMTN Network II. The Commission noted that RTH Melbourne had announced its firm intention join the IMTN Network II, and that RTH Washington had also indicated a similar intention.

***Planning an implementation strategy***

**6.2.21** The Commission stressed the need of a clear strategy, at regional and global levels, for the implementation of an adequate data communication infrastructure for WIS; it endorsed the Planning an implementation strategy guidelines as included in the Annex to this paragraph.

***Data discovery, access and retrieval services, including time delivery services***

**6.2.22** The Commission agreed that Data Discovery, Access and Retrieval (DAR) services based on request/reply "pull" mechanism with relevant data management functions should comply with policy principles as follows:

- (a) Procedures for managing access rights, control of data retrieval, registration and identification of users, should be defined, as and when required;
- (b) Anonymous downloading is technically possible, but depends on whether a NC permits that feature;
- (c) DAR mechanisms have no system-inherent features that would violate international legal frameworks.

**6.2.23** To comply with the principles, DAR components and connection networks with necessary protocols and procedures should be based on universal standards and independent from specific vendor architectures. Inevitably DAR services are implemented essentially through the Internet with HTTP, FTP and other Internet based protocols. The WIS core network is expected to support the services with synchronization of metadata catalogues

## **Data-communication systems and techniques**

### ***TCP/IP and related protocols on the GTS***

**6.2.24** The Commission noted the status of development and acceptance of the IPv6 protocol suite in the industry, including tests conducted by the ECMWF, and agreed that it was still too early for any recommendation on the timeframe for IPv6 to become a viable solution for WMO purposes, and IPv6 testing studies of possible migration strategies should be pursued.

**6.2.25** The Commission noted that the VGISC project in RA VI included the use of an authentication scheme to implement data access policies, where users and data are defined to be part of certain domains. It requested its OPAG to urgently consider such schemes that are necessary for the development of GISCs and DCPCs.

### ***Guidance for implementation of data communication facilities (GTS & Internet) at WWW Centres***

**6.2.26** The Commission noted with appreciation that the Guide on IT Security had been updated, and could be considered by NMHSs as a reference security document. Additions have been made in particular on Intrusion Detection and Intrusion Prevention systems, and to update some reference material.

**6.2.27** The Commission noted that the Internet is used to provide GTS connection in a significant number of centres. E-mail is the most widely used protocol in such implementations. It was also noted that although this proved to be successful in many cases, there were many examples of unreliable/insecure Internet. In particular, very remote areas such as small islands in the Pacific proved to pose very special problems that even the Internet could not solve. In view of the inherent risks of the Internet, the Commission agreed that this type of operational use should be considered case by case, when no other affordable means were available. It noted that the Guide on Internet Practices had been updated. The Commission also noted with interest that tests were carried out on the possible use for WMO related information exchange of some innovative Internet techniques (e.g. "blog based technology").

**6.2.28** The Commission noted that IP VPN technology over the Internet had been extensively tested by ECMWF and RA VI RMDCN countries for possible backup connections providing for any-to-any connectivity. The Guide on IP-VPN was updated accordingly, and some issues needed to be further tested.

**6.2.29** The Commission noted with satisfaction that the file naming convention as described in Attachment II.15 (Use of TCP/IP on the GTS) was successfully implemented and used in a number of NMHSs. The Commission urged all centres to implement this procedure facilitating a migration from bulletin to file exchange and to complete the transition as soon as possible.

*[The current Guides mentioned above in are available on the WMO Website.]*

## **GTS operation and information exchange**

### ***Procedures for collection, routing and distribution of data and products***

**6.2.30** In accordance with the Manual on the GTS, the limits for meteorological bulletins for alphanumeric and binary data had been increased to 15 000 and 500 000 octets respectively as from November 2007. The Commission noted that some WWW centres encountered problems in receiving or transmitting such bulletins when the size limits configured on their circuits are less than these limits. This hampered the exchange of data and products on the GTS, and in particular

the migration to TDCF. The Commission urged Members to apply the procedures related to the length of meteorological bulletins as included in the Manual on the GTS. The Commission invited RTHs to monitor the application of the procedures and rectify any problems caused by inadequate configuration of the size limits in the message receiving and transmitting systems in their areas of responsibility.

**6.2.31** The data designators of the abbreviated headings of certain bulletins exchanged on the GTS, in particular satellite bulletins, are not included in Attachment II-5 of the Manual on the GTS or are used for different data types than those mentioned in Attachment II-5. Noting that this could lead to errors in handling and processing the relevant bulletins, the Commission urged the centres that were inserting such bulletins on the GTS to make available, for example through the Internet, the definitions of these special data designators; It also urged Members to comply with the recommended procedures, as included in the Manual on the GTS, for the allocation and use of data designators.

**6.2.32** Noting that the Manual on the GTS calls for global exchange of observations, the Commission stressed that this exchange requirement should be independent of the data encoding form as long as it was a standard WMO form. The Commission confirmed the final goal for a global exchange of WMO required data and products in TDCF. It therefore urged the OPAG-ISS to review the Manual on the GTS to reflect this.

**6.2.33** The Commission agreed to recommend amending the Manual on the GTS with a view to allocating:

- A geographical designator for Montenegro, and designators for RARS data and SYNOP data and surface observations from one hour period in Attachment II-5 – Data designators T<sub>1</sub>T<sub>2</sub>A<sub>1</sub>A<sub>2</sub>ii in abbreviated headings;
- A two-letter code to be used by international organisations in the field <location indicator> of the general file naming conventions.

The Commission adopted Recommendation 6.2/1 (CBS-XIV) concerning amendments to the Manual on the GTS, Volume I, Global Aspects, Part II.

### **Global monitoring of the operation of the WWW**

**6.2.34** The present scheme of the global monitoring of the operation of the WWW coordinated by the Secretariat includes the Annual Global Monitoring (AGM), the Special MTN Monitoring (SMM) and the Integrated WWW Monitoring (IWM). The Secretariat also coordinates the Specific Monitoring on the exchange of Antarctic data (SAM). CBS-Ext.(06) agreed to move from the test phase to a pre-operational phase of the IWM as from October 2007. WMO Members were invited to stop producing AGM reports as soon as they prepare IWM reports. Both IWM and the SMM are therefore expected to replace the AGM.

**6.2.35** The Commission was pleased to note that a guide on the implementation of the IWM prepared by the OPAG-ISS was available in the WMO server and that it includes procedures for the monitoring of the availability of BUFR/CREX reports. The planning and implementation of the IWM was relying on the action taken by RTHs. The Commission noted that ten RTHs participated in the 2008 IWM. It urged all RTHs to participate in the IWM and to coordinate the implementation of the IWM with their associated NMCs.

**6.2.36** Noting that, within the framework of the SMM, RTHs were contributing or had committed to contribute to the monitoring of certain data types presented in BUFR, including surface and upper-air observations from RBSN stations and aircraft reports, the Commission

invited RTHs to also contribute to the monitoring of other types of observational data presented in BUFR, particularly climate and marine data.

**6.2.37** The Commission urged RTHs and NMCS to examine the analysis of the monitoring exercises as provided and posted by the Secretariat on the WMO server, and to take further action to mitigate the deficiencies observed.

### **Radio frequencies for meteorological activities**

**6.2.38** The Commission noted with much appreciation that the World Radiocommunication Conference (WRC-07, Geneva, 2007) had a very favourable outcome as regards several agenda items that were directly related to meteorology, attributable to the active preparation and participation of WMO. The relevant positions of the World Meteorological Organization (WMO) were presented in a comprehensive document prepared by the SG-RFC.

**6.2.39** The Commission noted that the agenda of the next World Radiocommunication Conference (WRC-11) included several items of serious importance for WMO, and it concurred with the WMO preliminary position on WRC-11 developed by the SG-RFC meeting and being submitted to relevant ITU-R groups. It noted with satisfaction that the update of the joint ITU-WMO publication which was now entitled "*Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction*" was finalized and was being published in six languages mainly as an electronic publication, jointly with the ITU-R. It noted with satisfaction that a Workshop on "Radio-frequencies for Weather, Water and Climate Monitoring and Prediction" was planned in the fourth quarter of 2009, as a joint WMO/ITU event co-sponsored by the two Organizations. The handbook is an important common reference for both NMHSs and national Radiocommunication Authorities. The Commission also noted with satisfaction that the SG-RFC activities were an important contribution to the respective GEO task.  
(Documentation available at [http://www.wmo.int/pages/prog/www/TEM/WMO\\_RFC/index\\_en.html](http://www.wmo.int/pages/prog/www/TEM/WMO_RFC/index_en.html))

**6.2.40** The Commission emphasized that the threat on the full range of radio frequency bands allocated to meteorological systems and environmental satellites would continue with the increasing development and expansion of new commercial radiocommunication systems, especially Ultra Wide Band (UWB) devices, i.e. radiocommunication systems operating with very large bandwidth. The Commission, recalling Resolution 3 (Cg-XV), confirmed the importance of NMHSs being aware of the criticality of issues related to the various radio frequency bands used by meteorological and related systems. It urged Members to ensure that their respective national Radiocommunication Authorities were fully aware of the impact of relevant issues for WMO related operations and research, and to seek their cooperation and support. The Commission asked the Steering Group on Radio-Frequency Coordination to actively pursue its activities, including preparatory activities for WRC-11.

### **Data Management matters**

#### ***Data representation and codes***

**6.2.41** The Commission noted that the CBS Management Group had agreed to test the direct adoption of recommendations for amendments to the Manuals between CBS sessions with a view to saving time during the CBS sessions and reducing delays in the approval of amendments. Draft procedures were agreed by correspondence and a pilot project to test the draft procedures was successfully carried out. The Commission therefore recommended endorsing these procedures and agreed on a revision of the procedures for amending the Manual on Codes, including the fast track procedure, the procedure for adoption during CBS sessions and the procedure for adoption between CBS sessions.

**6.2.42** The Commission noted that the Secretariat was informing Members about amendments by providing an updated electronic version of the relevant part of the Manual on Codes, which were also posted in the four languages on the WMO Web server; distribution of supplements was discontinued.

**6.2.43** The Commission agreed that the NMHSs running automated processing systems such as encoders, decoders and translators require the code tables in an electronic format suitable for these systems and that all these users currently had to translate these tables. The electronic format of presentation of the code tables should also facilitate the management of the changes to the Manual. The Commission therefore requested the Secretariat to make available the code tables in an appropriate electronic format with the assistance of experts of the OPAG-ISS, and to adapt the form of presentation of the Manual on Codes in this respect.

**6.2.44** The list of Master Tables in the Manual on Codes includes Master Table 10 for oceanography maintained by the International Oceanographic Commission (IOC). Noting the progress made in the development of Master Table 10, the Commission agreed that it was time to clarify the respective role of IOC and WMO in its management and recommended that CBS and JCOMM jointly develop a proposal in this respect.

### ***Modifications to the Manual on Codes***

**6.2.45** The Commission recalled the scheme agreed upon by CBS-Ext.(02) (see WMO-No. 955, paragraph 6.2.66) which defined a three-step mechanism for modifications to BUFR, CREX and GRIB 2 tables. The Commission endorsed the outcome and recommendations of the OPAG concerning additions to data representation tables, including those approved during the intersessional period for operational and pre-operational use, as summarized in the following paragraphs.

**6.2.46** The Commission concurred with a set of additions to the Code Tables approved as operational by the chair of OPAG on ISS, the vice-president and the president of CBS during the intersessional period in:

- GRIB Edition 2: for TIGGE products, Earth model representation, precipitation rates, event Probabilities, quantitative precipitation forecasting, WAFS products and sign convention for fluxes;
- In BUFR: cloud information;
- In CREX and BUFR: regulations related to use of units, especially for aviation information;
- In Common Code Tables:
  - A scheme for radiosonde numbers;
  - Definitions of centres and sub-centres, in particular for the satellites data exchange RARS system, satellites data types, sub-categories for surface data, instruments for water temperature profile measurement.

**6.2.47** The Commission agreed to a set of additions of parameters in GRIB 2 Tables for: templates for chemicals, data representation template for run length packing with level values, templates for atmospheric aerosols and parameters for meteorological products related to Moisture, Cloud, Vegetation/Biomass and Soil.

**6.2.48** The Commission agreed to additions to BUFR/CREX Tables:

- For satellite data: GHRSSST data, SBUV/2 ozone data, JASON2 OGDR data, entries for GOME Experiment, METOP GOME-2 template, SMOS data, for encoding all sky radiance data, for encoding IASI principal component scores and enhanced data from IASI;
- Templates for SYNOP data manually encoded in CREX, METAR/SPECI and TAF coded in BUFR or CREX;
- BUFR Templates for surface observations from one-hour period, synoptic reports from sea stations (VOS), representation of SYNOP data with one-hour observations, synoptic reports from fixed land stations and for maritime data from coastal and island stations;
- BUFR/CREX Template for Deep-Ocean Tsunameter Data, Tide Elevation Data, wave observations;
- Sequence for locust data, descriptors for radiation, for Air Chemistry, for GFA (Graphical Forecast AIRMET) data and for volume (3-D) radar data.

**6.2.49** The Commission agreed to insert a note in the text of Code FM 54-X Ext ROFOR (Route forecast for aviation) to notify the end of ICAO requirement for the message, upon ICAO's request.

**6.2.50** The Commission adopted draft Recommendation 6.2/2 (CBS-XIV) – Amendments to the Manual on Codes, Volume I.2, and draft Recommendation 6.2/3 (CBS-XIV) – Amendment to the Manual on Codes, Volume I.1. It recommended operational implementation of the amendments on 4 November 2009. *[The Recommendations are included in CBS-XIV/Doc. 6.2(2).]*

**6.2.51** The Commission stressed the importance for all WMO Programmes to review their requirements in terms of data representation and codes, and to submit relevant proposals for amendments to the Manual on Codes to the Expert Team on Data Representation and Codes (ET-DRC).

### ***Migration to Table Driven Code Forms (TDCF)***

**6.2.52** About ten per cent of the surface and upper-air reports expected from the RBSN stations were received in BUFR form at MTN centres in 2008. The Commission noted the continued slow progress in the migration since CBS-Ext.(06).

**6.2.53** EC-LX (2008) urged all WMO Members to finalize and implement plans for the migration in accordance to the international migration plan approved by Congress. The Commission noted that the replies to the 2007 questionnaire on the migration to TDCF showed a significant increase in the development of national Migration Plans that should lead to a significant increase of BUFR data exchange. However, noting the limited number of replies, the Commission urged the WMO focal points for code and data representation matters to be more responsive to such questionnaires and to contribute information on the migration of their countries. The Commission agreed that the 2003 and 2007 questionnaires provided valuable insight into the migration progress including the identifications of issues, and agreed to pursue this practice.

**6.2.54** The available guidance, self-training and encoder-decoder software developed by the CBS expert teams, regional coordinators/rapporteurs and Members are instrumental in facilitating the migration by Members. The Commission noted with satisfaction that the Secretariat distributed

to Members a guidance document prepared by the CT-MTDCF with a view to increasing the awareness of the benefit of the migration by the NMHSs. The Commission was also pleased to note that Canada provided a template-oriented BUFR library and API as well as a template writing guide, that Brazil provided BUFR encoding and decoding tools, and ECMWF a web verification service for BUFR/CREX data. The Commission stressed the important role of the regional coordinators/rapporteurs in monitoring and supporting the migration in their Regions.

**6.2.55** The Commission noted possible arrangements for facilitating a step-by-step migration by zones. When the migration for a type of data is completed within the zone of responsibility of an RTH, the parallel exchange of data in both TAC and TDCF is not required anymore. The systematic exchange of the data in TAC from centres within such a zone, called type B, may be discontinued if appropriate gateway arrangements are made between this zone B and other zone(s) still needing TAC bulletins, called type A. These arrangements for a step-by-step migration by zones could consist in:

- Establishing a gateway function ensuring conversion of the forms of representation of data (TDCF/TAC) between zones; some centres may agree to contribute to such a gateway;
- And/or continuing the parallel relay of TAC and TDCF data from (some) NMCs or RTHs only from zone B to zones A.

**6.2.56** The Commission noted the survey on the capabilities of RTHs and NMCs to encode and decode BUFR and convert data between TAC and BUFR. WMO focal points for code and data representation matters were invited to provide/confirm the dates when their country was in a position to send and receive data in TDCF and discontinue receiving data in TAC. The Commission invited RTHs to continue compiling such information from their zone of responsibility and the focal points to continue updating such information, to facilitate RTHs planning a step-by-step migration. The Commission invited RTHs to consider facilitating the step-by-step migration by assisting in the definition of arrangements between zones of responsibility of MTN centres and RTHs, and by monitoring the exchange of TDCF bulletins and reports on the GTS.

**6.2.57** The Commission agreed to give the highest priority for technical cooperation activities to support the migration to the training on TDCF in the WMO Regional Training centres, and to the development and implementation of projects for the migration to TDCF. The Commission encouraged NMHSs to collaborate in the development of projects, for example within a zone of responsibility of an RTH, and to submit requests for support, if required, through the WMO Voluntary Cooperation Programme. Noting the capacity building efforts made in Region I, the Commission emphasized the importance and expected impact of establishing a Migration Implementation Project (MIP) for the Region, with support from the Secretariat and donors.

**6.2.58** The Commission emphasized that the WMO Integrated Global Observing System (WIGOS) demonstration and pilot projects should address the generation and exchange of data in TDCF where appropriate. It requested that these projects be reviewed in this respect, and integrate specific migration activities or Migration Implementation Project (MIP).

**6.2.59** The Commission confirmed the migration matrix given in Annex to this paragraph.

### ***Assessment of and policy on data representation systems***

**6.2.60** The Commission noted with satisfaction that the Expert Team on the Assessment of Data Representation System (ET-ADRS) within the OPAG-ISS was established and started its work on assessing advantages and disadvantages of different data representation systems.

**6.2.61** The Commission requested the OPAG-ISS to cooperate with the NetCDF and the Climate and Forecast (CF) communities with a view to:

- Develop proposals for a coordination mechanism to drive forward the NetCDF format and the CF metadata standards to be fit for operational meteorology (WMO requirement);
- Consider the question of the resources (e.g. at NMHS level) required to support the data format and metadata standard development;
- Develop a model for the governance.

**6.2.62** The Commission agreed that the CBS policy on Data Representation Systems (DRS) should be driven by users' requirements. It stressed the importance of the interoperability between the different DRS that were utilized.

**6.2.63** The Commission agreed that the application of the ISO 191xx series of geographic information standards to the development of a WMO conceptual model of data representation should be considered as a fundamental element of a CBS policy on data representation systems, in particular with a view to:

- Applying a standard approach for data representation, leading to the development of a WMO core profile of the ISO 191xx series for data and metadata, encompassing the WMO core profile of the ISO metadata standard, in line with other initiatives such as INSPIRE); the application schemata and associated tables used to represent data in BUFR, CREX, XML, NetCDF or HDF, such as the BUFR/CREX/GRIB tables, may be used to develop this WMO core profile for data and metadata, in particular to develop the relevant ISO 191xx feature catalogues, application schema(ta) and data product specification(s);
- Facilitating the interoperability and data interchange between applications based on data representations systems associated to BUFR, CREX, GRIB, XML, NetCDF and HDF.

**6.2.64** The Commission was pleased to note the establishment of the CAeM-CBS Expert Team on OPMET Data Representation (ET-ODR) tasked to specifically address the requirements of aeronautical meteorology, including ICAO, for Data Representation systems. The Commission noted the development of a pilot project for the presentation of OPMET data in XML and requested the OPAG-ISS to pursue the development of the project in collaboration with CAeM and ICAO.

### ***Metadata development and implementation***

**6.2.65** The initial version 1.0 of the WMO core profile of the ISO Metadata standard included extensions of the ISO 19115 standard, i.e. additional elements and extensions to the code lists, which may lead to difficulties, for example when using existing software applications to create or interpret the metadata. Draft version 1.1 of the WMO core profile of the ISO Metadata standard WMO had therefore been developed, in which the additional elements were deleted and the extensions of code lists were reviewed. The Commission endorsed the WMO core profile version 1.1 of the ISO Metadata standard (available at <http://wis.wmo.int>), and requested to submit proposals to add the extensions of the code lists to the ISO 19115 to the ISO Technical Committee 211 responsible for the ISO 19100 series of geographical information standards.

**6.2.66** The Commission stressed the importance for all WMO Programmes to review their requirements in terms of metadata and to submit relevant proposals for the further development of the WMO core profile of the ISO Metadata standard.

**6.2.67** The operational catalogues, such as Discovery, Access and Retrieval (DAR) catalogues (sets of WMO core profile metadata descriptions), Volumes A and C1 of WMO Publication No. 9, have to be considered as ISO “data sets”. The ISO 19100 standards provide methods for the development of schemas of data sets but provide standard schemas only for metadata data sets. The ISO 19100 standards recommend the development of Feature Data Dictionaries and Feature Catalogues with a view to harmonizing the definition of features between catalogues. The Commission agreed that it will take time to develop these Feature Data Dictionaries and Feature Catalogues and that their contents must be defined within the respective WMO Programmes responsible for the data to be described. It recommended that the development of catalogues, such as the catalogue of variables measured by a standard observing station, or the catalogue of instruments used for variables measured by standard observing stations should not wait for the development of these Feature Data Dictionaries and Feature Catalogues.

**6.2.68** The requirements for the maintenance of operational catalogues are basically common across the WMO operational catalogues. The mechanisms and procedures defined for any of these catalogues could be applied to the others. The Commission recalled the responsibilities of GISCs and DCPCs for the maintenance of the DAR catalogues, each centre being responsible to collect catalogue entries, e.g. DAR metadata descriptions, from the WMO Members countries located in their zones of responsibility.

**6.2.69** The Commission noted with appreciation that Météo-France had developed an application for the conversion of the GTS operational information, such as Volume C1 of WMO Publication No. 9 and the Manual on Codes, into metadata required for the operation of the WIS GISCs and that this application is provided by Météo-France to all potential GISCs and DCPCs.

**6.2.70** The Commission recommended that the following procedures be implemented by the WIS centres for the creation and validation of metadata:

- To define the roles (creator, reviewer, administrator) in the WIS centre;
- To establish mechanism(s) for providing advisories and assistance (for example at GISCs);
- To filters the entries in order to remove undesirable contents;
- To validate the XML schemas.

**6.2.71** The Commission was pleased to note that the IPET-MI had initiated the drafting of a “best practice” guide for the implementation of the WMO Core Profile of the ISO Metadata standard. This guide should include information on how to use available software packages, such as the open source software application “Geonetwork”, originally developed by FAO, to create metadata, in particular from templates.

**6.2.72** The Commission further recommended investigating the availability of training on the ISO standards, in particular on how to apply UML/GML, and that implementers and users should be able to access help desks for assistance, and users should be able to provide feedback to metadata originators.

## **Future activities**

**6.2.73** The Commission reviewed the key tasks of the OPAG on ISS for the forthcoming CBS intersessional period (2009-2010); it endorsed the OPAG's proposals including its expert teams, and their respective terms of reference [*which are given in the Annex to this paragraph*], to reflect priorities, progress achieved, and looking for cost efficiencies for undertaking the activities (see agenda item 12.2).

**Annex to paragraph 6.2.21 of the general summary**

**WIS DATA COMMUNICATION INFRASTRUCTURE - PLANNING AN IMPLEMENTATION STRATEGY**

1. Planning and implementation strategy guidelines are as follows:
    - (a) Smooth evolution with a view to ensure a coordinated transition without interruption of GTS operation in an evolutionary process of the GTS, especially the Improved MTN;
    - (b) Extension of participating centres to include other participants, non-NMHSs, in future;
    - (c) Consider the different level of development of centres and the fact that availability of communications technology in each country and/or region is variable;
    - (d) Change the current vision from connection centric to data centric to better address the data management issues concerning all WMO and related international programmes. WIS major components, i.e. GTS, DAR and IGDDS should share a unified data management concept to assure information interoperability;
    - (e) Effective coordination of timeliness requirements. In each implementation phase, timeliness requirements are not necessarily fulfilled by the WIS real-time network independently of ICT improvement. Timeliness requirements (e.g. for highest priority exchange such as Tsunami Warning and Advisory) should be practically coordinated to ensure that requirements are met.
  2. The strategy should include the practical outcomes of studying the following topics:
    - (a) Achievable goal of each implementation phase to allow centres to evaluate their position and to facilitate evolution activity;
    - (b) Flexible and extensible implementation to allow centres to keep up with the evolution process, enabling small centres to join the WIS without a significant increase in budget and human resources;
    - (c) Cost-effective, reliable and sustainable evolution, taking advantage of ICT developments, such as use of managed network services and international industry standards for protocols, software and hardware;
    - (d) Coordination framework for administrative issues - WIS data communication structure should be established through collaboration of multi-nations as well as the Improved MTN. There are many administrative hurdles towards a large-scale collaboration, since each nation has different rules for procurement procedures, contractual and accounting systems, and international arrangements. Establishment of a coordination framework for administrative issues in each responsible area is required for the management of an AMDCN;
    - (e) Coordinated salvage schemes - In spite of a flexible and scalable implementation plan, there may be a centre which is not able to catch up the evolution process. Coordinated salvage schemes in technical and financial supports are necessary to avoid stopping development;
    - (f) Integration of data management with network coordination - The current GTS evolving into the WIS main component should implement key data management functions, i.e. information interoperability with DAR, IGDDS and other components by harvesting and sharing of metadata and metadata catalogues, and better sharing of information on a data policy perspective, such as the compliance with WMO Resolutions 25 and 40.
-

Annex to paragraph 6.2.59 of the general summary

MIGRATION MATRIX

CATEGORY OF TRADITIONAL ALPHANUMERIC CODES (TAC)	Nov. 2005	Nov. 2006	Nov. 2007	Nov. 2008	Nov. 2009	Nov. 2010	Nov. 2011	Nov. 2012	Nov. 2013	Nov. 2014	Nov. 2015	Nov. 2016
1. Common: SYNOP; TEMP PILOT; CLIMAT	<i>Start operational exchange</i>					Migration Complete						
2. Satellite Observations: SARAD, SAREP SATEM, SATOB	<i>Operational exchange</i>	Migration Complete										
3. Aviation: METAR, SPECI, TAF			<i>Start experimental exchange</i>	<i>Start operational exchange</i>								Migration Complete
AMIDAR	<i>Operational exchange</i>	Migration Complete										
4. Maritime: BUOY, TRACKOB BATHY, TESAC WAVEOB, SHIP CLIMAT SHIP PILOT SHIP TEMP SHIP CLIMAT TEMP SHIP	<i>Start experimental exchange</i>		<i>Start operational exchange</i>									Migration Complete
5. Miscellaneous: RADOB, IAC IAC FLEET GRID, RADOF	<i>Experimental exchange</i>	<i>Start operational exchange</i>		Migration Complete								
6. Obsolete: ICEAN, GRAF, NACLI etc, SFAZI, SFLOC, SFAZU, ROCOB, ROCOB SHIP, CODAR, WINTEM, ARFOR, ROFOR, RADREP, MAFOR, HYDRA, HYFOR												
<i>NOT APPLICABLE</i>												

### MIGRATION MATRIX NOTES:

- (1) Aviation Codes require ICAO coordination and approval, except for AMDAR.
  - (2) SAREP and RADOB require coordination by the ESCAP/WMO Typhoon Committee.
  - (3) For category 5, codes need to be reviewed in order to decide whether or not they should be migrated to BUFR/CREX.
  - (4) Codes in category 6 are not to be migrated.
  - (5) All dates above are meant as "not later than". However, Members and Organizations are encouraged to start experimental exchange, and, if all relevant conditions (see below) are satisfied, to start operational exchange as soon as possible.
- **Start of experimental exchange** means: data will be made available in BUFR (CREX) but not operationally, i.e. in addition to the current alphanumeric codes, which are still operational.
  - **Start of operational exchange** means: data will be made available in BUFR (CREX) whereby some (but not all) Members rely on them operationally. Still the current alphanumeric codes will be distributed (parallel distribution).
  - **Migration complete** means: at this date the BUFR (CREX) exchange becomes the standard WMO practice. Parallel distribution is terminated. For archiving purposes and at places where BUFR (CREX) exchange still causes problems the alphanumeric codes may be used on a local basis only.

#### **Relevant conditions to be satisfied before experimental exchange may start:**

- Corresponding BUFR/CREX-tables and templates are available;
- Training of concerned testing parties has been completed;
- Required software of testing parties (encoding, decoding, viewing) is implemented.

#### **Relevant conditions to be satisfied before operational exchange may start:**

- Corresponding BUFR/CREX-tables and templates are fully validated;
  - Training of all concerned parties has been completed;
  - All required software (encoding, decoding, viewing) is operational.
-

## **Annex to paragraph 6.2.73 of the general summary**

### **OPAG-ISS EXPERT TEAMS (2009-2012)**

#### **Implementation Coordination Team on Information Systems and Services (ICT-ISS)**

- (a) Assess the implementation aspects at the regional and global levels, including sustainability, of the recommendations and proposals developed by the ISS Teams;
- (b) Review and consolidate the recommendations and proposals developed by the ISS Teams with a view to their submission to CBS;
- (c) Monitor, assess and take follow-up action on ISS requirements emerging from the cross-cutting WMO Programmes and other international Programmes/projects such as THORPEX, IPY, DPM and GEOSS;
- (d) Identify matters requiring the urgent consideration of the OPAG on ISS, and develop proposals for tasks and organization of activities.

#### **Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC)**

(Requirements for changes to representation forms should be provided by the WMO Programmes)

- (a) Maintain WMO data representations and further develop table-driven codes in particular BUFR, CREX, and GRIB edition 2, by defining descriptors, common sequences and data templates, including the data representation of regional practices, so they meet the requirements of all Members and other concerned international organizations, such as ICAO, most efficiently;
- (b) Adapt and update the alphanumeric code regulations for table-driven code forms; coordinate with the OPAG on IOS to ensure their observation representation requirements are met;
- (c) Invite, coordinate and assist Members to validate modified or new formats, and provide Members with guidance on data representation of national practices;
- (d) Monitor and coordinate the progress of migration to TDCF;
- (e) Update the content of the *Manual on Codes* (WMO-No. 306) and associated reference and guidance materials as required and publish in suitable electronic formats;
- (f) Publish the Code Tables in appropriate processable electronic formats.

#### **Inter-Programme Expert Team on Metadata and Data Inter-operability (IPET-MDI)**

- (a) Development of a WMO core profile of the ISO 191xx series of standards for metadata and data, encompassing the WMO Metadata core profile of the ISO metadata standard, including relevant ISO 191xx feature catalogues, application schema(ta) and data product specification(s);
- (b) Further develop procedures and guidance for the interoperability of metadata and data, including BUFR, CREX, GRIB, XML, NetCDF and HDF, and liaise with the NetCDF and the Climate and Forecast (CF) communities in this respect;
- (c) Develop a WMO inter-programme metadata and data representation policy, including governance;
- (d) Coordinate extensions to the WMO core profile needed to satisfy the requirements of all WMO Programmes;
- (e) Develop guidance for the implementation and use of the data representation systems, metadata and the WMO core profile, including training aspects;
- (f) Propose extensions to the ISO 191xx series of standards required for the WMO core profile and liaise with ISO as required.

### **Expert Team on WIS-GTS Communication Techniques and Structure (ET-CTS)**

(Co-chairperson on Data Communication Techniques; co-chairperson on WIS-GTS data communication structure.)

- (a) Develop recommended practices and technical guidance material for data communication techniques and procedures (GTS, WIS and Internet), including security aspects, with a view to ensuring efficient and safe operations of information systems, and inform Members of relevant developments in standard bodies in particular ITU and ISO;
- (b) Review standard TCP/IP procedures and applications, including new developments (e.g. IPv6) that are relevant to WIS and WMO Programme requirements, and develop recommended practices especially for the GTS;
- (c) Review and further develop recommended practices for data communication and access procedures, including exchange of high priority data and products in support of a virtual all hazards network within WIS-GTS;
- (d) Maintain the file naming convention, in particular for operational routing and distribution;
- (e) Develop the organization and design principles for the WIS data communication structure, and coordinate related pilot projects;
- (f) Review and further develop the organization and design principles for the WIS data communication structure, in particular the smooth evolution of the GTS and the WIS core network;
- (g) Provide guidance on technical, operational, administrative and contractual aspects of data communication services for WIS implementation, especially for the GTS at the global, regional and national levels, including dedicated and public services (e.g. satellite-based telecommunications, managed data-communication network services, the Internet);
- (h) Advise and assist ICG-WIS on the relevant technical aspects of the Manual on WIS

### **Expert Team on WIS Centres (ET-WISC)**

- (a) Further develop technical and operational specifications for the different components of the WIS Centres and criteria for interoperability and certification for actual implementation;
- (b) Further develop specifications for the GISC, DCPC and NC interfaces, including a unified user interface for WIS components;
- (c) Coordinate related pilot projects;
- (d) Determine the monitoring requirements for the WIS and develop the WIS monitoring scheme;
- (e) Advise and assist ICG-WIS on the relevant technical aspects of the Manual on WIS

### **Expert Team on WIS-GTS Operation and Implementation (ET-OI)**

(Activities to be carried out in particular by the focal points of RTHs located on the MTN, in close coordination with the IPET-DRC chairperson with the assistance of the Secretariat, mainly by correspondence/ e-mail.)

- (a) Monitor the WIS-GTS operational information flow and coordinate management of operational information exchange procedures, routing and traffic, with a particular attention to the exchange of high priority data and products in support of a virtual all hazards network within WIS-GTS;
- (b) Assist in the migration to TDCF, in particular in a step-by-step migration by zones;
- (c) Coordinate the implementation of the file naming convention;
- (d) Coordinate the implementation of the WMO core profile of 191xx series of standards as regards the relevant exchange of data and metadata;
- (e) Coordinate and further develop recommended practices and guidance on the management of, and access to, operational information related to WMO Programmes' information exchange,

- especially for WIS-GTS operation (abbreviated heading tables, catalogue of bulletins and files, routing directories, etc.);
- (f) Develop recommendations for coordinated implementation and planning of techniques, procedures and systems for the MTN and MTN centres, including towards the core communication component of WIS;
  - (g) Review, coordinate and further improve the WWW monitoring, in particular the AGM, SMM and IWM;
  - (h) Review the standard and recommended procedures and practices of the Manual on the GTS related to the operation of the GTS, and propose amendments as required;
  - (i) Identify implementation issues requiring the urgent consideration of the OPAG on ISS.

### **Steering Group on Radio-Frequency Coordination (SG-RFC)**

- (a) Keep under review allocations of radio-frequency bands and assignments of radio-frequencies to meteorological activities for operational requirements (telecommunications, instruments, sensors, etc.) and research purposes, in close coordination with other technical commissions, especially CIMO and the CBS/OPAG on IOS;
  - (b) Coordinate with WMO Members, with the assistance of the WMO Secretariat, to:
    - (i) Ensure the proper notification and assignment of frequencies used for meteorological purpose;
    - (ii) Determine their future use of the radio spectrum for meteorological purpose;
  - (c) Keep abreast of the activities of the Radio-communication Sector of the International Telecommunication Union (ITU-R), and in particular of the Radio-communication Study Groups, on frequency matters pertaining to meteorological activities, and represent WMO in ITU-R work;
  - (d) Prepare and coordinate proposals and advice to WMO Members on radio-regulation matters pertaining to meteorological activities with a view to ITU Radio-communication Study Groups, Radio-communication Assembly, World Radio-communication Conferences and related regional/global preparatory meetings;
  - (e) Facilitate the coordination between WMO Members for the use of frequency bands allocated to meteorological activities with respect to:
    - (i) Coordination of frequency use/assignments between countries;
    - (ii) Coordination of frequency use/assignments between various radio communication services (e.g. meteorological aids and data collection platforms (DCPs)) sharing the same band;
  - (f) Facilitate the coordination of WMO with other international organizations which address radio spectrum planning, including specialized organizations (e.g. CGMS, the Space Frequency Coordination Group (SFCG) and regional telecommunication organizations, such as the European Conference of Postal and Telecommunications Administrations (CEPT), the Inter-American Telecommunication Commission (CITEL), and the Asia-Pacific Telecommunity (APT));
  - (g) Assist WMO Members, upon request, in the ITU coordination procedure of frequency assignment for radio-communication systems sharing a frequency band with meteorological radio communication systems.
-

**DRAFT RECOMMENDATION**

**Rec. 6.2/4 (CBS-XIV) - AMENDMENTS TO THE *MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM* (WMO-No. 386), VOLUME I, PART II**

**THE COMMISSION FOR BASIC SYSTEMS,**

**Noting:**

- (1) Resolution 1 (Cg-XV) - Technical Regulations of the World Meteorological Organization,
- (2) Resolution 2 (Cg-XV) - World Weather Watch Programme for 2008-2011,
- (3) The *Manual on the Global Telecommunication System* (WMO-No. 386), Volume I, Global Aspects, Part II,

**Recommends** that the *Manual on the Global Telecommunication System*, Volume I, Global Aspects, Part II, be amended as given in the Annex to this recommendation, with effect from 4 November 2009;

**Requests** the Secretary-General to make the amendments, as given in the Annex to this recommendation, to the *Manual on the Global Telecommunication System*, Volume I, Global Aspects, Part II;

**Authorizes** the Secretary-General to make any consequent purely editorial amendments of the *Manual on the Global Telecommunication System*.

---

**Annex to draft Recommendation 6.2/4 (CBS-XIV)****AMENDMENTS TO THE *MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM*  
(WMO-No. 386), VOLUME I****PART II, OPERATIONAL PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM****Attachment II-5**

Add the following allocations in Table C1 – Part I

<i>A<sub>1</sub>A<sub>2</sub></i>	<i>Country</i>
MK	Montenegro

Add the following allocations in Table C6

TTA	ii	Data type	TAC correspondence	Data Category/ Sub-Category (Common Table C13)
INA		Satellite data (AMSUA)		003003
INB		Satellite data (AMSUB)		003004
INH		Satellite data (HIRS)		003005
INM		Satellite data (MHS)		003006
ISI	01-45	Intermediate synoptic observations from fixed land stations	SYNOP (SIxx)	000/001 000/051
ISM	01-45	Main synoptic observations from fixed land stations	SYNOP (SMxx)	000/002 000/052
ISN	01-45	Synoptic observations from fixed land stations at non-standard time (i.e. 01, 02, 04, 05, ... UTC)	SYNOP (SNxx)	000/000 000/050

Add the following allocations in Table C7

TTA	ii	Data type	TAC correspondence	Data Category/ Sub-Category (Common Table C13)
KSI	01-45	Intermediate synoptic observations from fixed land stations	SYNOP (SIxx)	000/001 000/051
KSM	01-45	Main synoptic observations from fixed land stations	SYNOP (SMxx)	000/002 000/052
KSN	01-45	Synoptic observations from fixed land stations at non-standard time (i.e. 01, 02, 04, 05, ... UTC)	SYNOP (SNxx)	000/000 000/050

## Attachment II-15

In the part related to the general file naming conventions

After the sentences:

"<location indicator> defines the producer: Country, organization and the production centre; the country shall be represented by the official ISO 3166 standard 2 letter code. Example: <gb-metoffice-exeter>. Each field shall be separated by "-" symbol."

add the sentence:

"The ISO 3166 standard 2 letter code xx shall be used for international organizations and shall therefore be the two first characters of the location indicator of international organizations, e.g. "xx-eumetsat-darmstadt", "xx-ecmwf-reading"."

Add two lines at the end of Table 4.3 as follows (To be validated)

Table 4.3 Accepted type values

type	Meaning
met	The file is a metadata file pair which describes the content and format of the corresponding information file with the same name
tif	TIFF file
gif	GIF file
png	PNG file
ps	Postscript file
mpg	MPEG file
jpg	JPEG file
txt	text file
htm	HTML file
bin	a file containing data encoded in a WMO binary code form such as GRIB or BUFR

doc	a Microsoft Word file
wpd	a Corel WordPerfect file
Option 1: hdf Option 2: hd4 or hd5 (see Note 1)	HDF file
nc (see Note 2)	NetCDF file

Note 1: Only one of the two options to be kept in the table after selection and validation by the OPAG-ISS/Expert teams before CBS-XIV

Note 2: To be validated the OPAG-ISS/Expert teams before CBS-XIV

### Corrections to CBS-XIV/Doc. 6.2(1) proposed by the OPAG-ISS

In the Annex to draft Recommendation 6.2/4 (CBS-XIV) included in Appendix B to CBS-XIV/Doc. 6.2(1), to replace Table 4.3 by the following table:

**Table 4.3 Accepted type values**

type	Meaning
met	The file is a metadata file pair which describes the content and format of the corresponding information file with the same name
tif	TIFF file
gif	GIF file
png	PNG file
ps	Postscript file
mpg	MPEG file
jpg	JPEG file
txt	text file
htm	HTML file
bin	a file containing data encoded in a WMO binary code form such as GRIB or BUFR
doc	a Microsoft Word file
wpd	a Corel WordPerfect file
hdf	HDF file
nc	NetCDF file
pdf	Portable Document Format file