Paper for Consideration by NIPWG

Remodelling of the Radiocommunications Complex Attribute and Related Data Models

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Executive Summary:	This paper reports proposed remodelling of the radiocommunication complex attribute into 4 simpler complex attributes and two information types, 'Transmission Details' and 'Broadcast Details'. How such remodeling could be utilized to address issues of related data models is then illustrated by using 'WeatherForecastWarningArea' as an example.
Related Documents:	Product specifications of S-123, S-127, S-122
Related Projects:	S-123 Task Group

Introduction / Background

As reported by the S-123 task group to NIPWG9 (NIPWG9-07.1A), all technical feedback received for S-123 has been reviewed. During the task group meetings, there were major remodelling considerations regarding key features and information types. Many of them are closely coupled with the 'radiocommunications' complex attribute. Several meetings have been dedicated to this complex attribute. The task group first reached an agreement that the original radiocommunications complex attribute should be split into theme and method complex attributes. After further discussions and testing, the proposed remodelling of the 'radiocommunications' complex attribute and related data models is presented in this paper for consideration by NIPWG.

In the course of developing the proposal, a wide variety of sample data for reference, analysis and testing have been extracted from several publications and databases, including volumes of the Admiralty List of Radio Signals, ITU's List of Coast Stations and Special Service Stations (List IV as required by ITU Radio Regulations to be provided to all ships fitted with GMDSS ship stations), WMO's publication No.9 Weather Reporting Vol.D – Information to Shipping. In addition, original sample data prepared by NIPWG for S-123 Edition 1.0.0 as well as national examples provided by S-123 Task Group members have been used for the testing.

Proposal/Analysis/ Discussion

In S-123, the original 'radiocommunications' complex attribute, as shown in the left column of Table 1, is used in 'Radio Service Area' and 'Radio Station' feature types as well as 'Contact Details' information type, all with certain specific constraints in the combination of sub-attributes. A 'radiocommunications' complex attribute with less sub-attributes is also used in the 'Contact Details' of S-122 and S-127.

It is proposed that S-123's use of the 'radiocommunications' complex attribute be replaced by using 4 new complex attributes ('radiocommunication identifier', 'radio method', 'radio channel details', 'broadcast content') in two new Information types, namely 'Transmission Details' and 'Broadcast Details'.

As shown in Table 1, 'Transmission Details' consists of two complex attributes, 'radio method' and 'radio channel details'. 'Broadcast Details' includes attributes 'time of observation', 'transmission regularity', 'times of transmission', 'time intervals by day of week', remodelled 'broadcast content' and added 'language', 'online resource'.

Table 1 remodelling/replacement of the radiocommunications complex attribute

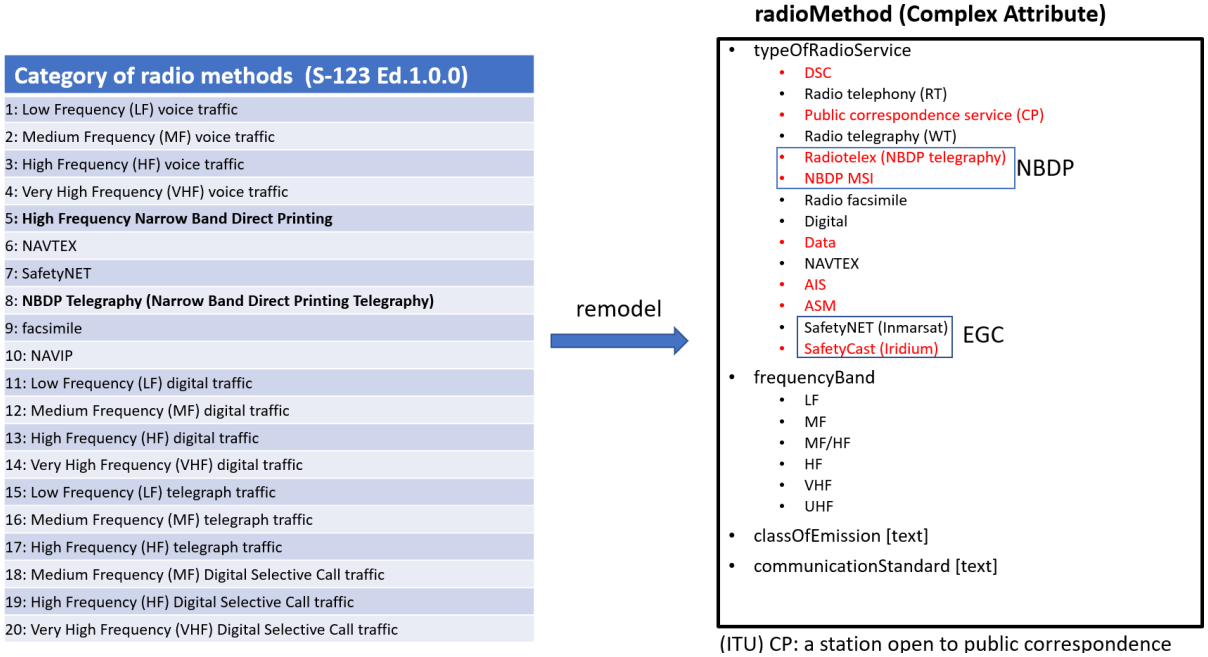
radiocommunications		TransmissionDetails (Information)	BroadcastDetails (Information)
Simple attributes		Complex attributes	Simple Attributes
categoryOfCommPref		radioMethod	language
communicationChannel		typeOfRadioService	transmissionRegularity
contactInstructions		frequencyBand	timeReference
categoryOfMaritimeBroadcast		classOfEmission	Complex Attributes
categoryOfRadioMethods	→	communicationStandard	broadcastContent
transmissionContent			typeOfBroadcastContent
transmissionRegularity		radioChannelDetails	subjectIndicatorCharacter
selectiveCallNumber		communicationChannel	subjectDescription
signalFrequency		frequencyPair	timeOfObservation

Complex attributes
frequencyPair
timeOfObservation
timesOfTransmission
tmIntervalsByDoW
facsimileDrumSpeed

frequencyShoreStationReceives	timesOfTransmission
frequencyShoreStationTransmits	timeIntervalsByDayOfWeek
txTrafficList	onlineResource
hoursOfWatch	headline
	linkage
	nameOfResource

By using the proposed Information types, common information could be encoded/maintained once and shared by all. The proposed complex attributes could be used by different feature or information types without having to impose further constraints on the sub-attributes.

The original list of 'categoryOfRadioMethods' is remodeled into 'radioMethod' complex attribute, as shown in Fig.1, to facilitate the inclusion of new types of radio services, such as 'Data', 'AIS', 'ASM' and 'SafetyCast' and to further differentiate/specify the types with added classOfEmission and communicationStandard attributes.



(ITU) CP: a station open to public correspondence

Fig.1 Remodelling of 'categoryOfRadioMethods' into 'radioMethod'

The proposed 'radioChannelDetails' complex attribute has two additional simple sub-attributes, namely 'txTrafficList' (boolean type) taken from 'RadioServiceArea' feature and 'hoursOfWatch' (text, e.g. H24/Continuous, HJ/Day service only, HX/No specific hours or fixed intermittent hours).
'RadioStation' features should then be encoded per 'radio Method' or equipment type, as shown in Table 2.

Table 2 RadioStation (remodelled)

Attributes		Original Attributes
categoryOfRadioStation (modified/updated list, optional) status estimatedRangeOfTransmission transmissionContent (e.g. "accept AMVER") radiocommunicationIdentifier (callSign, mMSI, selectiveCallNumber) remoteControlled		categoryOfRadioStation status estimatedRangeOfTransmission callSign
Information Binding	←	radiocommunications (sub-attr.)
BroadcastDetails (language, broadcastContent, time….) TransmissionDetails (radioMethod,radioChannelDetails) RadioControlCenter		categoryOfMaritimeBroadcast communicationChannel signalFrequency transmissionContent
Feature Binding: various service areas		

In S-123 domain, there are different aspects of service areas to be modelled: the responsible or intended/claimed area, the radio coverage, and the coverage of the content, as illustrated in Table 3.

Table 3 Aspects of Service Areas to be Modelled in S-123

S-123 Feature Type	Responsible/intended/claimed	Radio coverage	Content coverage
RadioServiceArea	✓✓	✓	of two-way comm.
NavtexServiceArea (originally, NavtexStationArea)	✓		✓
NavArea (NAVAREA, split from the original NavigationalMeteorologicalArea)	✓✓		✓
MetArea (METAREA, split from the original NavigationalMeteorologicalArea)	✓✓		✓
WeatherForecastWarningArea	✓		✓✓
GMDSSArea (merge InmarsatOceanRegionArea)	✓		

In cases where encoding the radio coverage with surface geometry seems impractical, e.g. in HF band, extent of the radio service may be encoded using the 'estimatedRangeOfTransmission' of 'RadioStation' feature, and/or the intended area, associated with Information types.

Take the 'WeatherForecastWarningArea' as an example for illustration of the proposed change of data model. According to WMO's "Guide to Marine Meteorological Services", related radio services (dissemination options) are as shown in Table 4.

Table 4. Radio Services Listed in WMO's Publication - Information to Shipping (Extract)

Well offshore (sea areas A3 and A4)	Coastal areas (sea areas A1 and A2)
Enhanced Group Call (EGC) System satellite transmissions HF NBDP HF radio voice services HF radiofax graphical services HF email Internet delivered by satellite providers	VHF/MF radio NAVTEX International NAVTEX Internet delivered by mobile network provider
	Ports, coastlines and land-based support operations
	Internet VHF radio NAVTEX
Note: As defined in IMO A.1051(27) Revised IMO/WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS) Guidance, "HF NBDP means High Frequency narrow-band direct-printing, using radio telegraphy as defined in Recommendation ITU-R M.688." HF digital data and email refers to ITU-R M.1798-2. In WMO's publication No.9 – Information to Shipping, WWMIWS is categorized into the following parts: Part A - Satellite Systems (e.g. transmission schedule for SateyNet services) Part B - Radio Voice Broadcasting using DSC (MF, VHF) Part C - NAVTEX Stations Part D - HF NBDP Part E - Radio-Facsimile	

Regarding the area coverage of the forecasts and warnings, WMO's guide states that "the understanding of these areas is important for mariners reading the text forecast or listening to the forecast on marine radio". The remodelled 'WeatherForecastWarningArea' of S-123, as shown in Table 5, should be able to serve such purpose, to clearly depict the area coverage of the content referred to in the text, voice or data by using (implicitly hierarchical) identifiers, metArea, nationality, forecastAreaIdentifier and the name encoded in 'featureName'.

Table 5. WeatherForecastWarningArea (remodelled)

Simple attributes	Feature Binding	Information Binding
categoryOfFrcstAndWarningArea 1. WMO 2. National high seas 3. National offshore 4. National coastal 5. National inshore	RadioStation	Authority TransmissionDetails BroadcastDetails (including onlineResource)

6. National local 7. Ice metArea (e.g. METAREA III (W)) nationality forecastAreaIdentifier (forecastAreaName) featureName		

In other words, 'WeatherForecastWarningArea' may be used to encode the WMO defined METAREA forecast/warning subareas for MSI (SafetyNet or SafetyCast), or the forecast/warning subareas defined by the serving nation for various dissemination options (radio services, including NAVTEX). In cases where binding with RadioStation is impractical, e.g. dissemination via satellite systems, binding with TransmissionDetails and BroadcastDetails should be useful enough.

When remodelling the 'categoryOfMaritimeBroadcast' into 'broadcastContent' complex attribute, reference was made to the grouping of subjects in the NAVTEX Manual (MSC.1/Circ.1403/Rev.1) and International SafetyNet Manual (MSC.1/Circ.1364/Rev.1), in particular, the B_2 subject indicator character used to set the message filtering or set off alarm of the receiving equipment. The proposed 'broadcastContent' as shown in Fig.2 should be able to support the encoding of any specific broadcast service, with the general subject categorization and specific subject description.

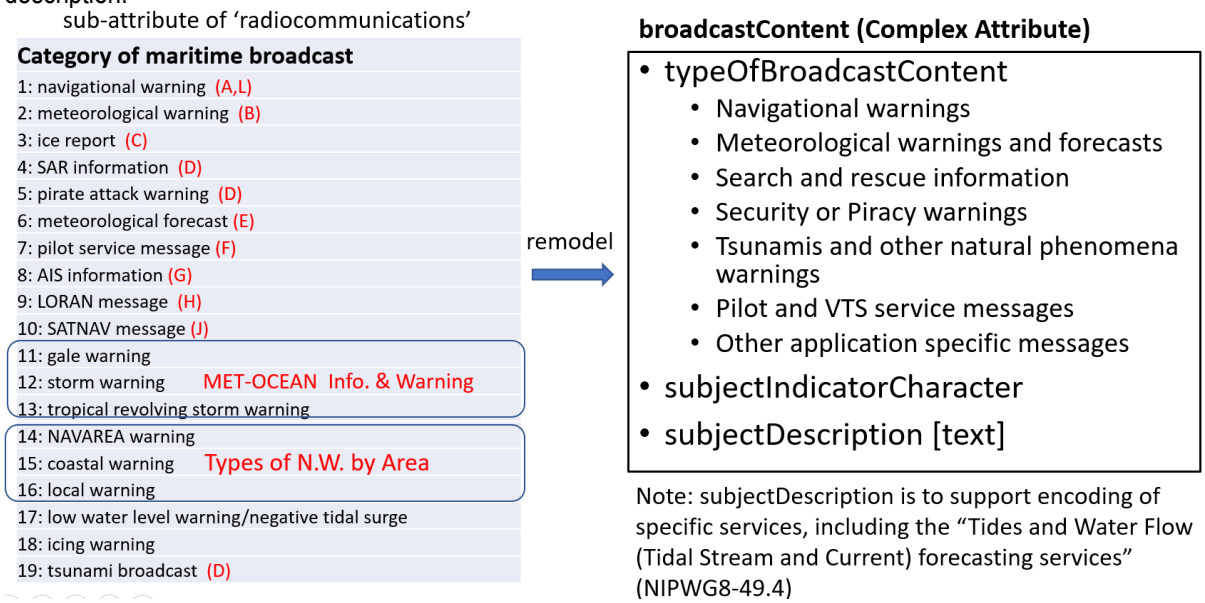


Fig.2 Remodelling of 'categoryOfMaritimeBroadcast' into 'broadcastContent'

Action required of NIPWG

The NIPWG is invited to:

a) Note this paper;
b) Provide input;
c) Consider the approval of the proposed change in S-123 data model, or
d) Take other actions as appropriate.