# Remodelling of the Radiocommunications Complex Attribute and Related Data Models

IHO NIPWG VTC02 (20 June 2023)

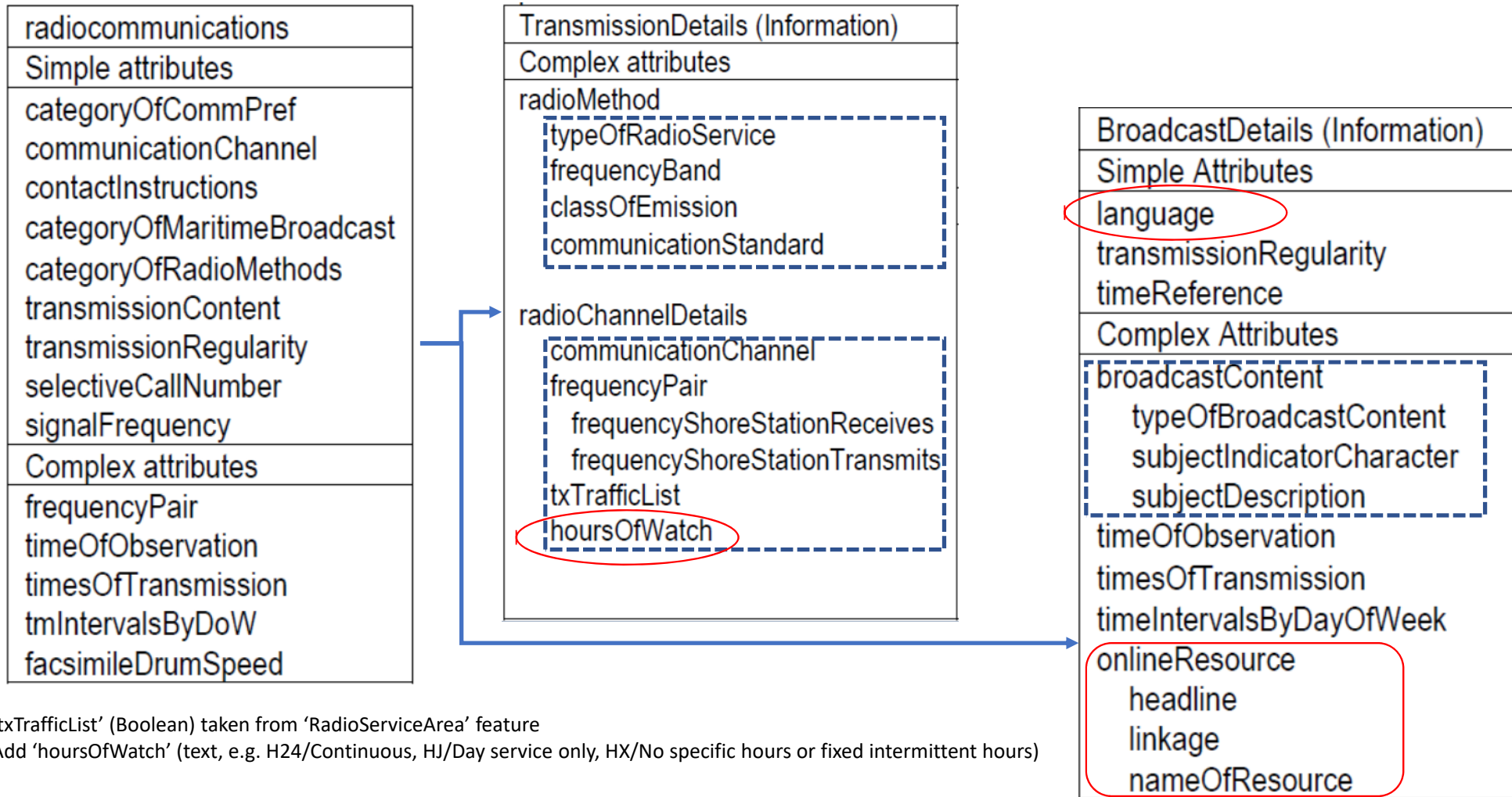Submitted by Shwu-Jing Chang (NTOU)

# Introduction/Background

- S-123 TG considered major remodelling of key feature and information types, mostly coupled with 'radiocommunications' complex attribute.
  - Based on technical feedback received for S-123
  - Agreed first to split it into **theme** and **method** complex attributes.
  - Further discussions and testing led to the proposed remodelling.
- Sample data used for testing or developing the proposal
  - Volumes of Admiralty List of Radio Signals
  - ITU's List of Coast Stations and Special Service Stations
    - List IV required by ITU Radio Regulations to be provided to all ships fitted with GMDSS
  - WMO's publication  No.9 Weather Reporting Vol.D - Information to Shipping
  - Original sample data prepared by NIPWG for S-123 Edition 1.0.0
  - National examples provided by S-123 Task Group members

# Proposal

- In S-123 Ed.1.0.0, 'radiocommunications' complex attribute is used in
    - 'Radio Service Area' and 'Radio Station' feature types
    - 'Contact Details' information type
    - all with certain specific constraints in the combination of sub-attributes.
- It is proposed to replace S-123's use of 'radiocommunications' by using
    - 4 new complex attributes
        - radiocommunication identifier → to be used in 'Radio Station'
        - radio method
        - radio channel details
        - broadcast content
    - 2 new Information types
        - Transmission Details (radio method, radio channel details,…)
        - Broadcast Details (broadcast content,…)

# Table 1 remodelling/replacement of 'radiocommunications'

| radiocommunications |
|---|
| Simple attributes |
| categoryOfCommPref |
| communicationChannel |
| contactInstructions |
| categoryOfMaritimeBroadcast |
| categoryOfRadioMethods |
| transmissionContent |
| transmissionRegularity |
| selectiveCallNumber |
| signalFrequency |
| Complex attributes |
| frequencyPair |
| timeOfObservation |
| timesOfTransmission |
| tmIntervalsByDoW |
| facsimileDrumSpeed |

| TransmissionDetails (Information) |
|---|
| Complex attributes |
| radioMethod |
|    typeOfRadioService |
|    frequencyBand |
|    classOfEmission |
|    communicationStandard |
| radioChannelDetails |
|    communicationChannel |
|    frequencyPair |
|      frequencyShoreStationReceives |
|      frequencyShoreStationTransmits |
|    txTrafficList |
|    hoursOfWatch |

| BroadcastDetails (Information) |
|---|
| Simple Attributes |
| language |
| transmissionRegularity |
| timeReference |
| Complex Attributes |
| broadcastContent |
|    typeOfBroadcastContent |
|    subjectIndicatorCharacter |
|    subjectDescription |
| timeOfObservation |
| timesOfTransmission |
| timeIntervalsByDayOfWeek |
| onlineResource |
|    headline |
|    linkage |
|    nameOfResource |

'txTrafficList' (Boolean) taken from 'RadioServiceArea' feature
Add 'hoursOfWatch' (text, e.g. H24/Continuous, HJ/Day service only, HX/No specific hours or fixed intermittent hours)

# 'categoryOfRadioMethods' → 'radioMethod'

**Category of radio methods  (S-123 Ed.1.0.0)**

1: Low Frequency (LF) voice traffic
2: Medium Frequency (MF) voice traffic
3: High Frequency (HF) voice traffic
4: Very High Frequency (VHF) voice traffic
5: **High Frequency Narrow Band Direct Printing**
6: NAVTEX
7: SafetyNET
8: **NBDP Telegraphy (Narrow Band Direct Printing Telegraphy)**
9: facsimile
10: NAVIP
11: Low Frequency (LF) digital traffic
12: Medium Frequency (MF) digital traffic
13: High Frequency (HF) digital traffic
14: Very High Frequency (VHF) digital traffic
15: Low Frequency (LF) telegraph traffic
16: Medium Frequency (MF) telegraph traffic
17: High Frequency (HF) telegraph traffic
18: Medium Frequency (MF) Digital Selective Call traffic
19: High Frequency (HF) Digital Selective Call traffic
20: Very High Frequency (VHF) Digital Selective Call traffic

remodel →
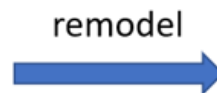
**radioMethod (Complex Attribute)**

- typeOfRadioService
  - DSC
  - Radio telephony (RT)
  - Public correspondence service (CP)
  - Radio telegraphy (WT)
  - Radiotelex (NBDP telegraphy)    NBDP
  - NBDP MSI
  - Radio facsimile
  - Digital
  - Data
  - NAVTEX
  - AIS
  - ASM
  - SafetyNET (Inmarsat)    EGC
  - SafetyCast (Iridium)
- frequencyBand
  - LF
  - MF
  - MF/HF
  - HF
  - VHF
  - UHF
- classOfEmission [text]
- communicationStandard [text]

(ITU) CP: a station open to public correspondence

# 'categoryOfMaritimeBroadcast' → 'broadcastContent'

sub-attribute of 'radiocommunications'

**Category of maritime broadcast**

1: navigational warning (A,L)
2: meteorological warning (B)
3: ice report (C)
4: SAR information (D)
5: pirate attack warning (D)
6: meteorological forecast (E)
7: pilot service message (F)
8: AIS information (G)
9: LORAN message (H)
10: SATNAV message (J)
11: gale warning
12: storm warning    MET-OCEAN  Info. & Warning
13: tropical revolving storm warning
14: NAVAREA warning
15: coastal warning    Types of N.W. by Area
16: local warning
17: low water level warning/negative tidal surge
18: icing warning
19: tsunami broadcast (D)

remodel →

**broadcastContent (Complex Attribute)**

- typeOfBroadcastContent
  - Navigational warnings
  - Meteorological warnings and forecasts
  - Search and rescue information
  - Security or Piracy warnings
  - Tsunamis and other natural phenomena warnings
  - Pilot and VTS service messages
  - Other application specific messages
- subjectIndicatorCharacter
- subjectDescription [text]

Note: subjectDescription is to support encoding of specific services, including the "Tides and Water Flow (Tidal Stream and Current) forecasting services" (NIPWG8-49.4)

$B_2$ subject indicator character (ref. NAVTEX Manual & International SafetyNet Manual)
used to set the message filtering or set off alarm of the receiving equipment

# Radio Station (remodelled)

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

'RadioStation' features should then be encoded per 'radio Method' or equipment type

### Radio Station (S-123 Ed.1.0.0)

| Original Attributes |
|---|
| categoryOfRadioStation |
| status |
| estimatedRangeOfTransmission |
| callSign |
| radiocommunications (sub-attr.) |
| categoryOfMaritimeBroadcast |
| communicationChannel |
| signalFrequency |
| transmissionContent |

# 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) | ✓ | | |

When impractical to encode the radio coverage, e.g. in HF band,
(1) Encode the extent of the service by using 'estimatedRangeOfTransmission' of 'RadioStation' feature
(2) Encode the intended area, associated with Information types (TransmissionDetails, BroadcastDetails)

# Example : 'WeatherForecastWarningArea'

- Satellite Systems/EGC
- Radio Voice
- NAVTEX
  - International, national
- HF NBDP
- Radio-Facsimile
- HF email
- Internet (satellite/mobile)

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<br>HF NBDP<br>HF radio voice services<br>HF radiofax graphical services<br>HF email<br>Internet delivered by satellite providers | VHF/MF radio<br>NAVTEX<br>International NAVTEX<br>Internet delivered by mobile network provider |
| | Ports, coastlines and land-based support operations |
| | Internet<br>VHF radio<br>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

Area coverage of the forecasts and warnings (content coverage) :
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"

# Radio Voice Broadcasting - Forecast Areas



228 North Labrador Coast
229 Northwest Labrador Sea
230 East Labrador Sea
231 Southwest Coast
232 South Coast
233 Southwestern Grand Banks
234 Southeastern Grand Banks
235 East Coast
236 Northern Grand Banks
237 Northeast Coast
238 Funk Island Bank
280 Bras d'Or Lakes
281 Halifax Harbour & Appr.

Position:
Call Sign:

Atlantic Coast Forecast Areas (Canada)

**CANADA**

**Halifax, Nova Scotia (MCTS)**

| | |
|---|---|
| **METAREA:** | IV |
| **Area Covered:** | Arctic coast, Atlantic Coast and S. Lawrence River |

Watch hours on Ch70
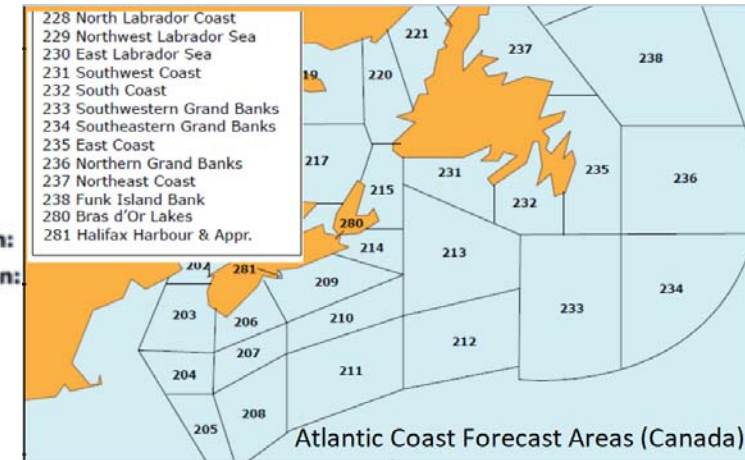
| Mode Of Transmission | ID | Frequency | Area | Remote Transmitting Site | Position | Hours of Operation |
|---|---|---|---|---|---|---|
| RT (MF) | A | 2 749 kHz | | Chebogue | 44°28'N 63°37'W | H24 |
| RT (MF) | B | 2 749 kHz | | Sambro | 44°28'N 63°37'W | H24 |
| VHF | C | Ch 21B | | Sambro | 45°20'N 61°05'W | H24 |
| VHF | D | Ch 83B | | Fox Islands | 44°58'N 62°09'W | H24 |
| VHF | E | Ch 83B | | Ecum Secum | 44°58'N 62°09'W | H24 |
| VHF | F | Ch 21B | | Saint John, N.B. (Red Head) | 45°14'N 65°59'W | H24 |

**CANADA**

| Broadcast Times | Frequency ID | Contents of Broadcast | Language/Code Form |
|---|---|---|---|
| 0140 | A | Technical marine synopsis, forecasts and wave height forecasts for marine areas 201 to 208. U.S. weather forecasts for Coastal Waters (Eastport to Schoodic Point, Maine) and Offshore Waters (Gulf of Maine to the Hague Line). Notices to Shipping in areas Bay of Fundy, South and West Coast Nova Scotia. | English followed by French) |
| 0240 | B | Technical marine synopsis, forecasts and wave height forecasts for marine areas 203 to 214. | |

# WeatherForecastWarningArea (remodelled)

- 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<br>  1. WMO<br>  2. National high seas<br>  3. National offshore<br>  4. National coastal<br>  5. National inshore<br>  6. National local<br>  7. Ice<br>metArea (e.g. METAREA III (W))<br>nationality<br>forecastAreaIdentifier<br>(forecastAreaName) featureName | RadioStation | Authority<br>TransmissionDetails<br>BroadcastDetails (including onlineResource) |

To encode
WMO defined METAREA forecast/warning subareas for MSI (EGC), 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

# Action required of NIPWG

The NIPWG is invited to:
- Note this paper;
- Provide input;
- Consider the approval of the proposed change in S-123 data model, or
- Take other actions as appropriate.