Bandplan Review

HF Data Segment Expansion / Revision 2021

Objectives

To review the data modes usage of the Amateur Radio HF spectrum and propose changes that:

- *Reduce inter-mode conflict between dissimilar operating modes*
- *Facilitate expansion of new technologies*

Background

The aim of band planning is to minimize interference between activities that have fundamentally different / incompatible transmission characteristics

The current IARU Band planning process is therefore based on:

- *Primary: Defining segments where particular bandwidth emissions are grouped*
- *Secondary: Defining Centre's of Activity within these groups to guide Radio Amateurs to carry out certain activities in agreed frequency band segments*

Problem 1 – definition by Bandwidth

Problem 1 – Segments by Bandwidth

- The use of “bandwidth” as a defining transmission characteristic is failing given advances particularly in data modes over the last decade.

- It no longer provides clear separation of these activities:
  - *Data vs Voice – both can use 2700Hz (and wider) bandwidths*
  - *Data vs CW – both can use 200Hz (and narrower) bandwidths*

- *It can also be mis-understood. Is the bandwidth of an FT8 channel 50Hz or 3kHz for example?*
  - *(It is 50Hz of course, but with multiple stations “sharing” a 3kHz spectrum slice)*

Problem 1 – Segments by Bandwidth

Further:

- *The notional 500Hz narrow band data mode definition is historically based on receiver bandwidth requirements for signal separation.*
- *However what do general amateurs understand bandwidth to mean in the context of the band plans?*
  - *Consider that an FT8 transmission is 50Hz, JT65 is 200Hz, WSPR is 5Hz – etc. but they all operate within a 3kHz receiver window – so are they narrowband or wideband?*
- *Does that mean we need more bandwidth definitions, or would that just confuse the band plan users even more?*

Problem 2 – Centre of Activity Characterisation

Problem 2 – Categories of Data

The original way of defining a band plan had, at its core, the notion that all communications were “conversational”.

Today’s data operating modes have, however, introduced new paradigms:

- *Time Synchronised transmissions for narrow band, very low bit-rate, set information structure exchange style communications*
- *Increased use of automated message passing networks – particularly for EMCOM scenarios*

Problem 2 – Categories of Data

- *The time synchronised modes, with their very weak signal capabilities, have in particular, proven wildly popular among a large proportion of the Amateur Radio community.*
  - *This has led to congestion within the utilized "3kHz" multiplex channels.*
- *This has also led to conflict between legacy conversational data modes and the newer time synchronised modes*
  - *Eg. previous attempts to expand the time synchronised mode channels into legacy conversational mode band centre's of activity*
- *More space needs to be found to support the existence of this new family of modes while separating it from conversational data mode activity*

Proposal

Aim

First:

- Update IARU's band plan definition toolkit:
  - *Augment "Bandwidth" as a defining characteristic with something more relatable to Amateur operators, that fundamentally supports the objective of keeping incompatible modes separated*
  - *Add additional data mode defined characteristics to help separate activities that are also fundamentally incompatible within the data mode family*

Then:

- Define new revised band plans using these tools focusing on the data sub-bands considering:
  - *Popularity and capacity requirements*
  - *Existing band users and inter-mode compatibility assessments*

Proposal 1 – Segments by Activity

Proposal 1

- **Primary usage definitions to be replaced with a simplified descriptions of band activity:**
  - ***CW Mode*** *– readable by a trained ear – can be hand sent – a non voice aural mode*
  - ***Voice/Image Modes*** *– direct human to human spoken or complex visual communication (can include digital transmission of speech and SSTV)*
  - ***Data Modes*** *– data streams generated by machines that require interpretation before they can be read as clear text on a screen*

Proposal 2 – Data Mode Definitions

Proposal 2

- **Enhance Centres of Activity definitions within the data mode segment to identify the three core types of data communication in use today:**

- The new plan proposes the Data segment be subdivided one layer further:
  - *Conversational Modes*
    - *PSK, RTTY, Olivia etc*
  - *Time Synchronised Modes*
    - *WSJT (FT8, JT9, JT65, WSPR etc) / JS8*
  - *Unattended Modes* *(currently flagged as ACDS)*
    - *APRS, PacTOR, WinLink*

Proposal 3 – Revise the Band Plans

Proposal 3

- **Develop representations of the HF band plans using the new tools including definition of the new Data Sub-band centre's of activity**
- **Address mode segment capacity shortfalls where they are identified**

Proposal 3 - Planning Principles

- **Harmonise the band plans globally as far as possible**
- **Seek to unify and simplify band segments**
  - so that clear simple boundaries exist to aid in implementation
- **When considering how to grow segments:**
  - ***First preference*** – Rearrange within existing usage category
    - Eg. rearrange the data segments noting changed activity mix to accommodate mode category expansion
  - ***Second preference*** - change primary usage category
    - Eg. Data to expand into non data mode segments as a last resort
    - Consider the impacts of WRC-03 and changed bandwidth now available (7MHz)
    - Consider regional limitations (eg 3.5MHz in Region 3 and country access limits)

Band Plan Charts

- A segment view focused on data modes is presented here
- For each band we present the current arrangement region by region followed by a new global response
- The full band plan proposals follow.

160M Band

To be addressed during a later review

80M Band

80m Detailed Changes

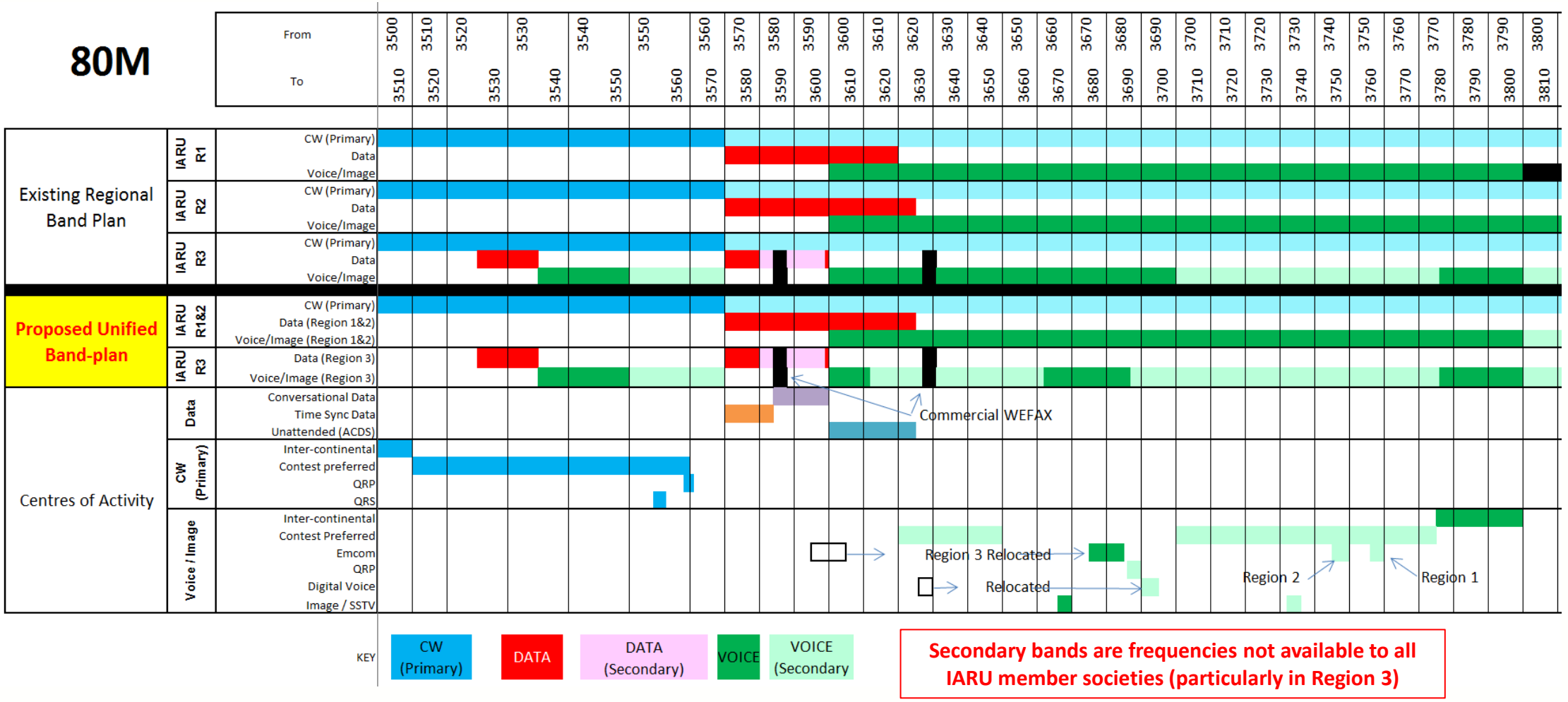
- **CW (Primary)** – **no change**
- **Data** – **50 → 54kHz bandwidth (shared with voice)**
  - 14kHz for "Time Sync Data"
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc – *3570-3584kHz*
  - 16kHz for conversational
    - *PSK recommended to move into 3590-3594kHz*
    - *Wideband Olivia/Domino etc recommended for 3584-3590kHz (Note Region 3 WEFAX Broadcasts on 3584 from HL)*
  - 25kHz for automatic unattended – (may not be fully available in Region 3)
    - *ACDS recommended in 3600-3625 kHz bringing Region 1 and 2 into alignment*
      - *(this needs to be demand tested – note it is already shared with Voice in R3 due to R3 spectrum constraints)*
- **Voice/Image** – **no change (subject to which region you are in)**
  - Share ACDS band as they do today
  - **Proposal:**
    - **EmCom Region 3 moves from 3600 to3680 kHz**
    - Digital Voice moves to 3690kHz

NOTE: Region 3 Allocations

A number of region 3 countries do not permit access to all of 80m, indeed much of the band is blocked to amateurs. As a result, there will need to be retained some Region 3 specific variations until such time as the authorities in those regions permit amateur activity over more of the band.

Aligns with majority region 3 regulatory access and separates it from data modes

80m Band – Structure & Options



Secondary bands are frequencies not available to all IARU member societies (particularly in Region 3)

80m Band - Proposal

	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
80m Band	3500-3570	CW		200	Intercontinental	3500-3510
					Contest Preferred	3510-3560
		CW	Data (R3)	2700	Region 3 Only - Secondary Data	3525-3535
			Speech (R3)	2700	Region 3 Only - Secondary Speech	3535-3570
		CW		200	CW - QRS	3555
					CQ - QRP	3560
	3570-3600	Data		200	WSPR Weak Signal Beacons (Dial 3568.6 kHz)	3570.0-3570.2
					Time Synced Modes (eg WSJT Family Modes)	3570-3584
				2700	Conversational Data (eg PSK/RTTY/Olivia)	3584-3600
	3600-3625	Data	Speech (R3)	2700	Automatic Controlled Data Stations (ACDS)	3600-3625
	3625-3700	Speech / Image		2700	SSTV Region 3	3670
					Emergency Comms Region 3	**3680**
					Digital Voice	3690
	3700-3775	Speech / Image		2700	SSTV	3735
					Emergency Comms Region 2	**3750**
					Emergency Comms Region 1	**3760**
	3775-3800	Speech / Image		2700	Inter-Continental DX Window	
REGION 2/3 Only	3800-3875	Speech / Image		2700	REGION 2/3 ONLY	
					SSTV	3845
	3875-3900	Speech / Image		6000	AM (6kHz BW allowed)	3885
	3900-4000	Speech / Image		2700	**Emergency Comms Region 2**	**3985**

60M Band

No Changes

40M Band

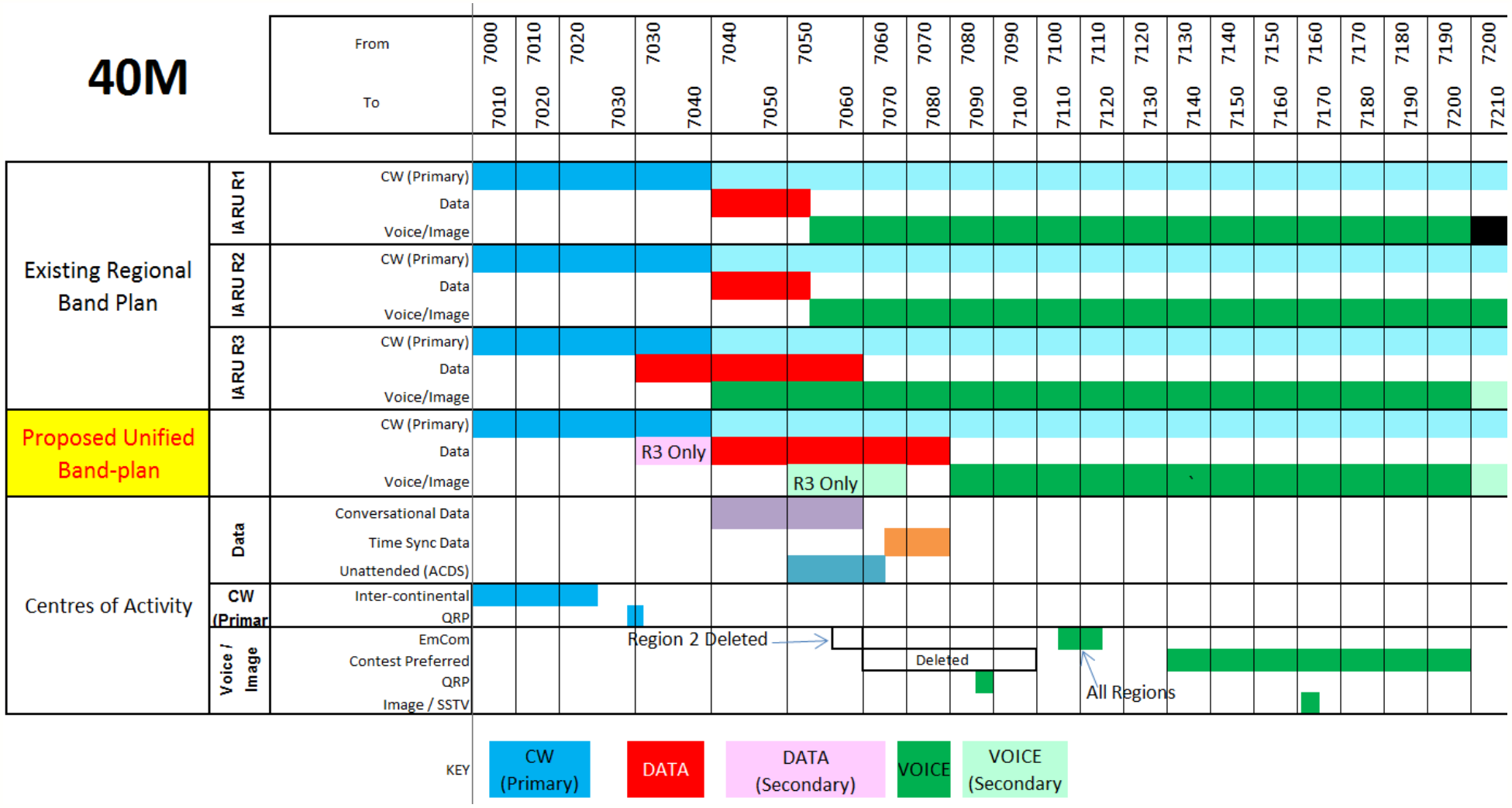
40m Detailed Changes

- **CW (Primary)** – **no change**
- **Data** – **13 → 40kHz bandwidth increase**
  - 15kHz for "Time Sync Data" 7065-7080kHz
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
  - 20kHz for conversational
    - *PSK/Olivia moves to Region 1/3 net on 7040-7044kHz*
    - *RTTY 7044 – 7060 kHz*
    - *ACDS 7050 – 7065 kHz– shares conversational*
  - *NOTE: Within Region 3 this would require the JA domestic FT8 channel to be moved. The suggestion to JARL is to consider 7037 as an alternative*
    - *(This exists due to local regulations prohibiting domestic data mode contacts between JA stations above 7045kHz)*

Note: Region 3 retains 7030-7040 Data due to regulatory limitations in some region 3 nations

- **Voice/Image** – **bandwidth reduction**
  147kHz → 120kHz (Region 1/2) or
  160kHz → 120kHz (Region 3)
  - 7053-7080 kHz (R1/2) or 7040-7080 kHz (R3) withdrawn from primary voice use
    NOTE: 7060-7070kHz to remain as secondary
  - OBSERVATION: 7070-7080 has been shared (badly) with data for years so **effective net loss is really only 7kHz in Region 1/2** with 10kHz remaining shared with data for "low power" local uses
  - Region 2 EmCom SSB channel must move from 7060
    - propose alignment with Region 1/3 on 7110 kHz
    - + leave 7240 and 7275 for USA

40m Band – Structure & Options



40m Band - Proposal

	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
40m Band	7000-7030	CW		200	CQ - QRP	7030
	7030-7040	CW	Data (R3)	2700	Region 3 Only - Data (due to restrictions above 7045kHz)	7030-7040
	7030-7040	CW	Data (R3)	2700	Japan Only - Time Synced Modes (eg WSJT Family Modes)	7037-7040
	7040-7060	Data		2700	WSPR Weak Signal Beacons (Dial 7038.6 kHz)	7040.0-7040.2
					Conversational Data (eg PSK/RTTY/Olivia)	7040-7060
					Automatic Controlled Data Stations (ACDS)	7050-7060
	7060-7065	Data	Speech	2700	Automatic Controlled Data Stations (ACDS)	7060-7065
					Digital Voice	7065
	7065-7070			200	Time Synced Modes (eg WSJT Family Modes)	7065-7070
	7070-7080	Data		200	Time Synced Modes (eg WSJT Family Modes)	7065-7080
	7080-7175	Speech / Image		2700	SSB Contest Preferred	7080-7100
					SSB - QRP	7090
					Emergency Comms	**7110**
					SSB Contest Preferred	7130-7175
					SSTV	7165
	7175-7200	Speech / Image		2700	SSB Contest Preferred - Priority for Intercontinental	7175-7200
REGION 2 Only	7200-7300	Speech / Image		2700	**Emergency Comms Region 2**	7240
					Emergency Comms Region 2	7275
					SSB - QRP	7285
					AM - 6kHz allowed	7290

30M Band

30m Summary

- **CW (Primary)** – **no change**
- **Data** – **no change**
  - **10kHz for "Time Sync Data" 10130-10140kHz – the band is too narrow to expand this segment**
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
    - *WSPR remains in 10140-10140.3 kHz*
  - **7kHz for conversational**
    - *PSK/Olivia remains on 10140-10143kHz*
    - *RTTY 10143-10147kHz*
  - **7kHz for Automatic Unattended (shared with RTTY)**
    - *ACDS – 10143-10150kHz*
- **Voice/Image** – **Not Permitted (with exceptions)**
  - VK/Africa (South of the equator) SSB should only use 10120-10130kHz

30m Band – Structure and Options

30M

			From	10100	10110	10120	10130	10140
			To	10110	10120	10130	10140	10150
Existing Regional Band Plan	IARU R1	CW (Primary)						
		Data						
	IARU R2	CW (Primary)						
		Data						
	IARU R3	CW (Primary)						
		Data						
Proposed Unified Band-plan		CW (Primary)						
		Data						
Centres of Activity	Data	Conversational Data						
		Time Sync Data						
		Unattended (ACDS)						
	CW	QRP						

KEY: CW (Primary) | DATA | DATA (Secondary) | VOICE | VOICE (Secondary

30m Band - Proposal

30m Band	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
	10100-10130	CW		200	CW - QRP	10116
	10125-10130	CW	Speech	2700	SSB Use restricted to VK & AF where permitted	10125-10130
	10130-10150	Data		2700	Time Synced Modes (eg WSJT Family Modes)	10130-10140
					WSPR Weak Signal Beacons (Dial 10138.6 kHz)	10140.0-10140.2
					Conversational Data (eg PSK/RTTY/Olivia)	10140-10144
					Automatic Controlled Data Stations (ACDS)	10144-10150

20M Band

20m Detailed Changes

- **CW (Primary)** – **no change**
- **Data** – **Expand to 14120 (8kHz) Shared with Voice**
  - 21kHz for "Time Sync Data" 14074-14095kHz
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
  - 24kHz for conversational
    - *PSK/Olivia remains on 14070-14074kHz*
    - *RTTY/Wideband MFSK modes (eg Domino and Wideband Olivia) 14095-14115kHz*
  - 19kHz for Automatic Unattended
    - *ACDS – 14101-14120kHz*
- **Voice/Image** – **3kHz reduction + a further 5kHz new shared SSB/Data**
  - SSTV side recommendation
    - ***SSTV CoA could move to 14330kHz to remove friction with SSB DX activity***

20m Band – Structure & Options

20M

20m Band

20m Band	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
	14000-14070	CW		200	Contest Preferred	14025-14060
					CW - QRS	14055
					CW - QRP	14060
	14070-14099	Data		500	Conversational Data (eg PSK/RTTY/Olivia)	14070-14074
					Time Synced Modes (eg WSJT Family Modes)	14074-14092
					WSPR Weak Signal Beacons (Dial 14095.6 kHz)	14097.0-14097.2
					Conversational Data (eg PSK/RTTY/Olivia)	14092-14099
	14099-14101	**CW**		**200**	**International Beacon Project**	**14100**
	14101-14115	Data		2700	Conversational Data (eg PSK/RTTY/Olivia)	14101-14115
					Automatic Controlled Data Stations (ACDS)	14101-14115
	14115-14120	Data	Speech	2700	Automatic Controlled Data Stations (ACDS)	14115-14120
	14120-14300	Speech / Image	All Modes	2700	SSB Contest Preferred	14125-14300
					Digital Voice	14130
					SSTV (existing)	14230
					Speech QRP	14285
					SSTV (New Proposed CoA)	14330
	14300-14350	Speech / Image	All Modes	2700	**Speech Emergency Comms (Global)**	**14300**

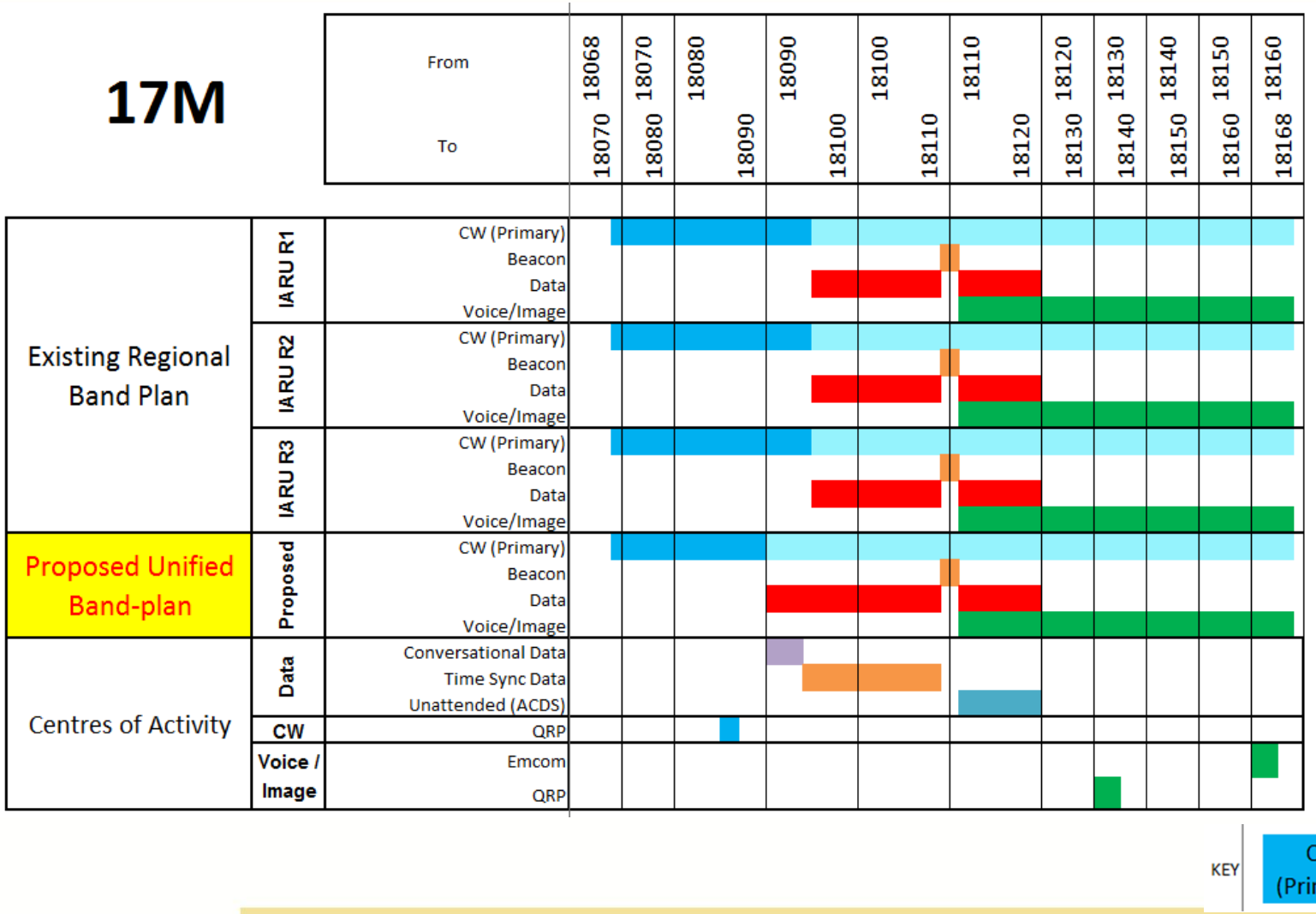
17M Band

17m Detailed Changes

- **CW (Primary)** – **Reduction from 27 → 22kHz (5kHz)**
- **Data** – **Expansion from 23 → 28kHz**
  - 15kHz for "Time Sync Data" 18094-18109kHz
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
  - 13kHz for conversational 18090-18094 + 18111-18120kHz
    - *PSK/Olivia/RTTY re-establish on 18090-18094kHz (previously they used 18100-18109 but have been displaced)*
    - *Wideband MFSK modes (eg Domino and Wideband Olivia) 18111-1812*0kHz
  - 9kHz for ACDS – 18111-18120kHz
- **Voice/Image** – **No Change**

17m Band – Structure and Options

17M



KEY: CW (Primary) | DATA | DATA (Secondary) | VOICE | VOICE (Secondary

17m Band - Proposal

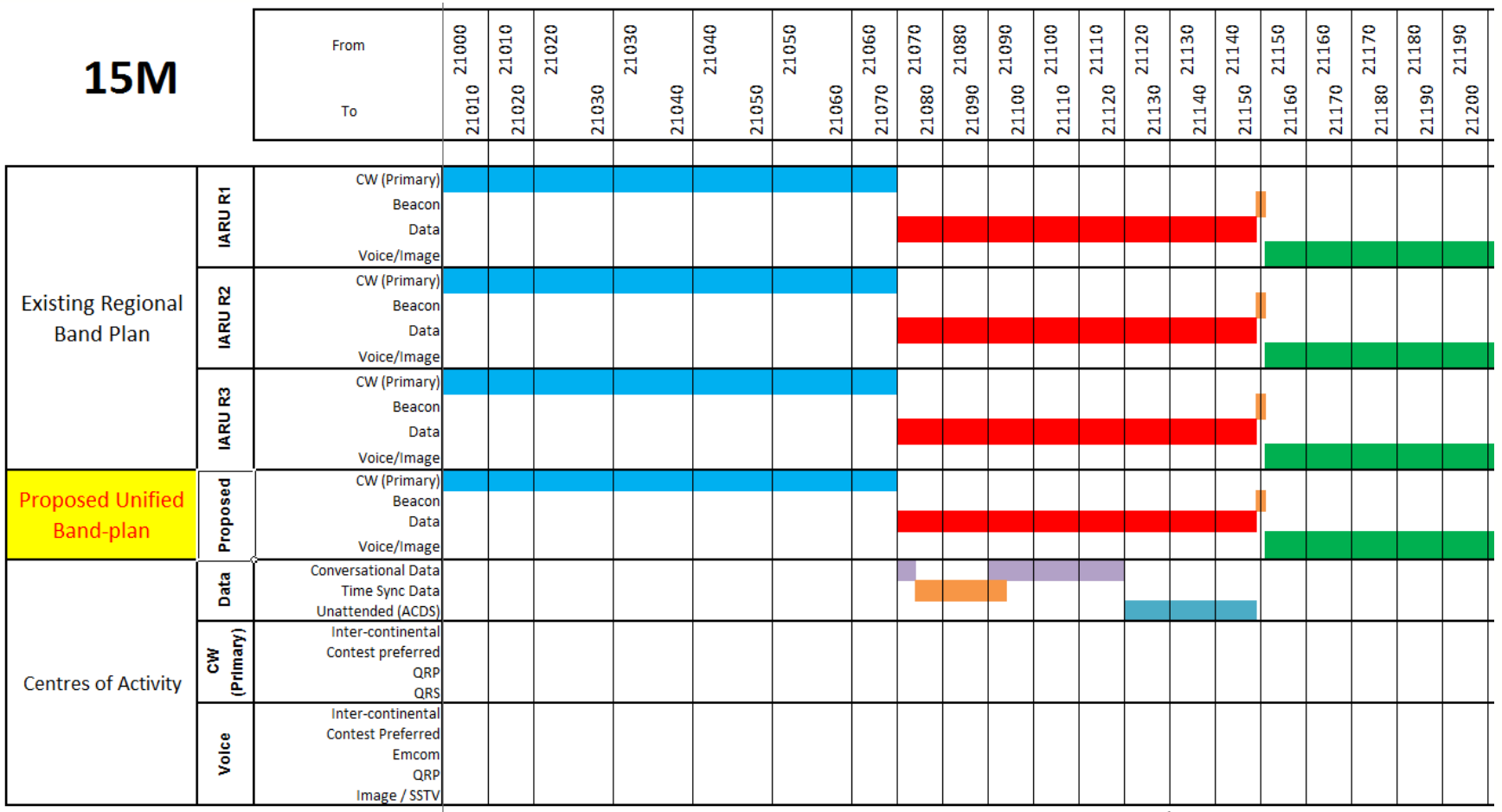
17m Band	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
	18068-18090	CW		200	CW - QRP	18086
	18090-18109	Data		2700	Conversational Data (eg PSK/RTTY/Olivia)	18090-18094
					Time Synced Modes (eg WSJT Family Modes)	18094-18109
					WSPR Weak Signal Beacons (Dial 18104.6 kHz)	18106-18106.2
	18109-18111	**CW**		**200**	**International Beacon Project**	**18110**
	18111-18120	Data	Speech	2700	Automatic Controlled Data Stations (ACDS)	18111-18120
	18120-18168	Speech / Image	All Modes	2700	Speech QRP	18130
					Digital Voice	18150
					Speech Emergency Comms (Global)	**18160**

15M Band

15m Detailed Changes

- **CW (Primary)** – **No Change**
- **Data** – **Sub-Band Usage Change Only**
  - 21kHz for "Time Sync Data" 21074-21095 kHz
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
  - 59kHz for conversational
    - *PSK/Olivia remain on 21070-21074 kHz*
    - *Wideband MFSK/RTTY modes (eg Domino and Wideband Olivia) 21095-21130 kHz*
  - 20kHz for ACDS – 21130-21150 kHz
- **Voice/Image** – **No Change**

15m Band – Structure and Options



15m Band - Proposal

	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
15m Band	21000-21070	CW		200	Contest Preferred	21025-21060
					CW - QRS	21055
					CW - QRP	21060
	21070-21149	Data		500	Conversational Data (eg PSK/Olivia/MFSK)	21070-21074
					Time Synced Modes (eg WSJT Family Modes)	21074-21094
					Conversational Data	21094-21100
					WSPR Weak Signal Beacons (Dial 21094.6 kHz)	21096.0-21096.2
				2700	Conversational Data (Wideband)	21100-21125
					Automatic Controlled Data Stations (ACDS)	21125-21149
	21149-21151	**CW**		**200**	**International Beacon Project**	**21150**
	21151-21450	Speech / Image	All Modes	2700	Digital Voice	21180
					Speech QRP	21285
					SSTV	21340
					Speech Emergency Comms (Global)	**21360**

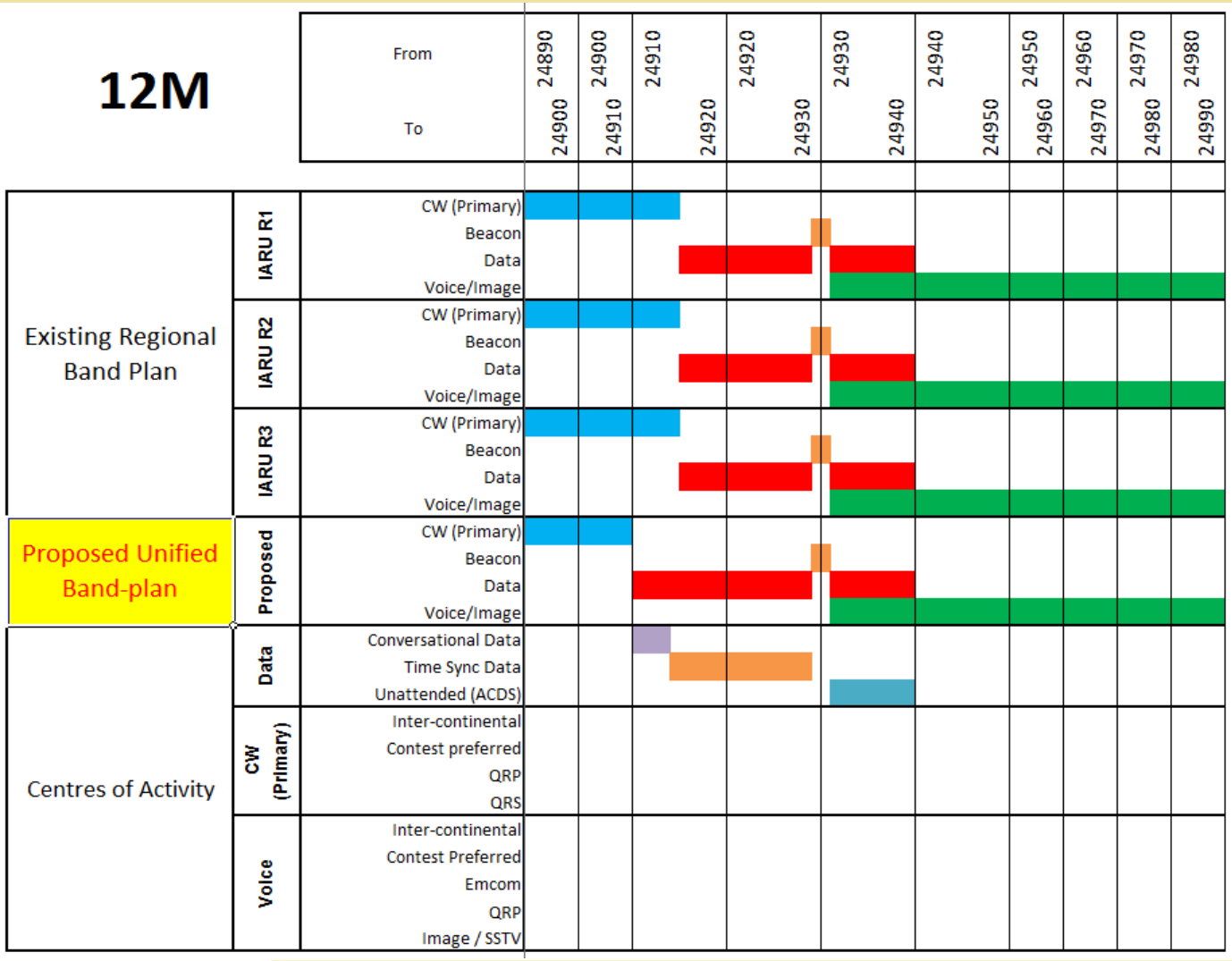
12M Band

12m Detailed Changes

- **CW (Primary)** – **Reduction from 25 → 20kHz**
- **Data** – **Expansion from 23 → 28kHz**
  - 15kHz for "Time Sync Data" 24914-24929kHz
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
  - 13kHz for conversational
    - *PSK/Olivia/RTTY re-establish on 24910-24914kHz*
    - *Wideband MFSK modes (eg Domino and Wideband Olivia) 24931-24940kHz*
  - 9kHz for ACDS – 24931-24940kHz
- **Voice/Image** – **No Change**

12m Band – Structure and Options

12M



KEY

CW (Primary)

DATA

DATA (Secondary)

VOICE

VOICE (Secondary

12m Band - Proposal

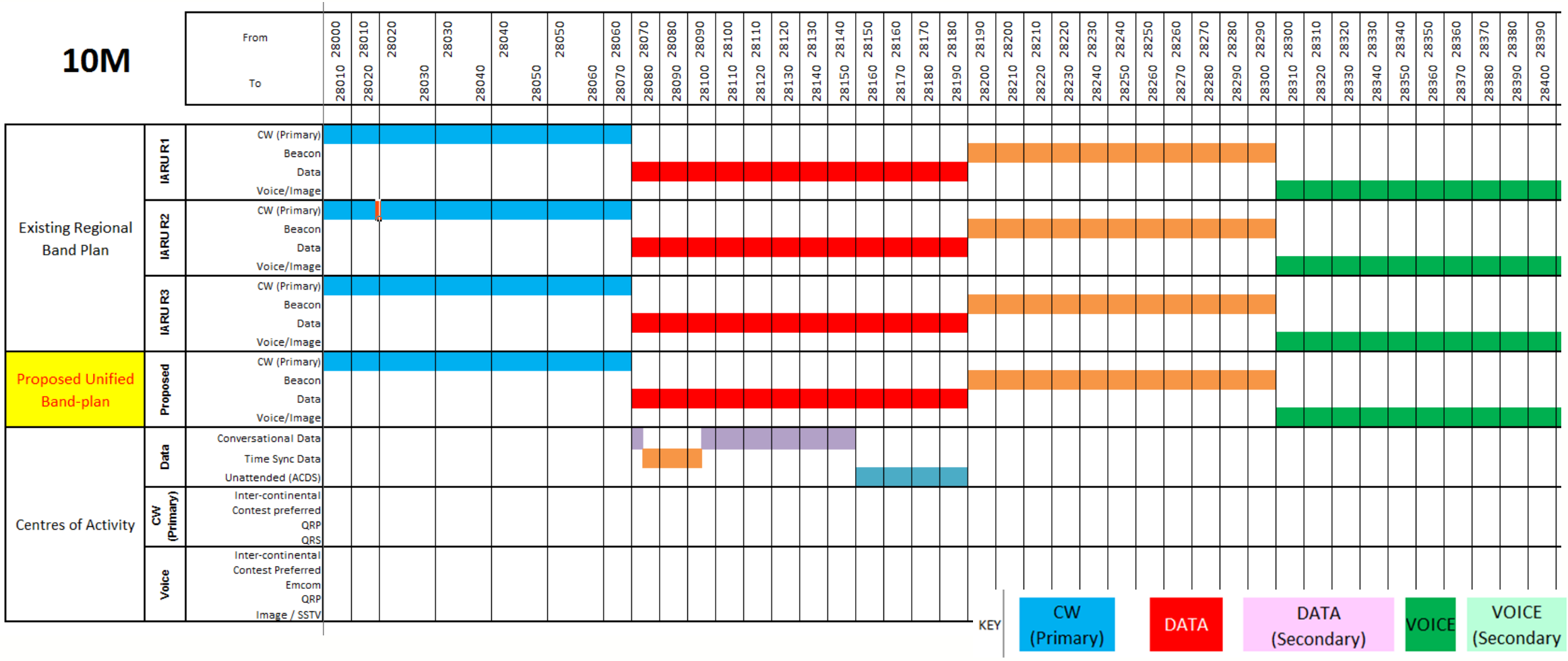
12m Band	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
	24890-24910	CW		200	CW - QRP	24906
	24914-24929	Data		2700	Conversational Data (eg PSK/RTTY/Olivia)	24910-24914
					Time Synced Modes (eg WSJT Family Modes)	24914-24929
					WSPR Weak Signal Beacons (Dial 24924.6 kHz)	24926-24926.2
	24929-24931	**CW**		**200**	**International Beacon Project**	**24930**
	24931-24940	Data	Speech	2700	Automatic Controlled Data Stations (ACDS)	24931-24940
	24940-24990	Speech / Image	All Modes	2700	Digital Voice	24940
					Speech QRP	24950

10M Band

10m Detailed Changes

- **CW (Primary)** – **No Change**
- **Data** – **Sub-Band Usage Change Only**
  - 21kHz for “Time Sync Data” 28074-28095 kHz
    - WSJT FT8, FT4, JT65, JT9, Q65, JS8Call etc
  - 59kHz for conversational
    - *PSK/Olivia remain on 28070-28074 kHz*
    - *Wideband MFSK/RTTY modes (eg Domino and Wideband Olivia) 28095-28150 kHz*
  - 50kHz for ACDS – 28150-28200 kHz
- **Voice/Image** – **No Change**

10m Band – Structure and Options



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10m Band - Proposal

	Frequency Segment (kHz)	Primary Mode	Secondary Mode	Max Bandwidth (Hz)	Centres of Activity	Sub-Band (kHz)
10m Band	28000-28070	CW		200	CW - QRS	28055
					CW - QRP	28060
	28070-28190	Data		500	Conversational Data (eg PSK/Olivia/MFSK)	28070-28074
					Time Synced Modes (eg WSJT Family Modes)	28074-28095
					Conversational Data	28095-28110
				2700	Conversational Data (Wideband)	28110-28150
					WSPR Weak Signal Beacons (Dial 28124.6 kHz)	28126.0-28126.2
					Automatic Controlled Data Stations (ACDS)	28150-28190
	28190-28199	**CW**		**200**	**International Beacon Project - Regional Time Shared Beacons**	
	28199-28201				**International Beacon Project - Primary**	**28200**
	28201-28225				**International Beacon Project - Continuous Duty Cycle Beacons**	
	28225-28300	BEACON		200	Beacons	
	28300-29000	Speech / Image	All Modes	2700	Digital Voice	28330
					Speech QRP	28360
					SSTV	28680
	29000-29200	Speech / Image	All Modes	6000	FM simplex - 10kHz channels	
	29200-29300	Data	All Modes	6000	Wideband Data	
	29300-29510	Satellite		6000	Satellite Uplinks	
	29510-29520	Guard Band			Satellite Guard Band	
	29510-29700	Speech	All Modes	6000	FM Repeater Inputs (RH1 - RH8)	29520-28590
					FM Calling Chanel	29600
					FM Simplex - Repeater (Parrot)	29610
					FM Repeater Outputs (RH1 - RH8)	29620-29690

WSJT Segment Suggestions

Within the Time Synchronised data segments it is not IARU's intention to prescribe individual channel/frequency usage. However migration from the existing arrangements needs to be carefully considered.

The following suggestions are provided for consideration by the WSJT community.

WSJT Channel Suggestions

- **80M – 14kHz**
  - *3570-3570.3 – WSPR (existing)*
    - *3568.6 dial*
  - *3570 – FT8 Fox*
  - *3573-3579 – FT8*
    - *3573 and 3576 as dial frequencies*
  - *3579-3581 – JT65/JT9/Experimental*
    - *3579 dial*
  - *3581-3584 – FT4*
- **40M – 15kHz**
  - *7065 – FT4*
    - *can spread to the FT8 Fox during contests*
  - *7068 – FT8 Fox*
    - *extra Fox activity on 7062 if needed*
  - *7071 – 7074 – JT65 / JT9 / Experimental*
    - *Potentially also JS8Call*
  - *7074 – 7080 – FT8*
    - *7074 and 7077 as dial frequencies*
  - *NOTE: WSPR to keep existing segment*
    - *7040-7040.3 kHz - WSPR (existing)*
      - *7038.6 dial*
- **30M – 10kHz**
  - *10130 FT8 Fox/FT4*
    - *(shared – FT4 contesting not allowed on 30m so this is just FT4 DX)*
  - *10133-10139 FT8*
    - *10133 & 10136 dial frequencies*
  - *10139-10140 JT65/JT9/Experimental*
    - *Note: narrow – reflects usage – IARU could reassess use up to 10142 later*
  - *10140.1-10140.4 kHz – WSPR (Existing)*
    - *10138.7 dial*
- **20M – 21kHz**
  - *14074-14083 – FT8*
    - *14074, 14077, 14080 dial frequencies*
  - *14083-14086 - JT65/JT9/Experimental*
  - *14086-14089 – FT4*
    - *14086 dial and could expand up to 14089 in contests*
  - *14089-14095 - FT8 Fox or FT8 contest mode*
    - *14089 and 14092 dial – contest*
  - *14097-14097.3kHz (WSPR existing)*
    - *14095.6 dial*

WSJT Channel Suggestions

- **17M – 15kHz**
  - *18100-18106 – FT8*
    - *18100 & 18103 dial*
  - *18106-18109 – JT65/JT9/Experimental*
    - *18106 dial avoiding WSPR*
  - *18106-18106.3 – WSPR (existing)*
    - *18104.6 dial*
  - *18097 - FT4 (DX Only)*
    - *18097 dial*
  - *18094-18097 – FT8 Fox*
    - *18094 dial or 18103 if more capacity required*
- **15M – 21kHz**
  - *21074-21083 – FT8*
    - *21074, 21077, 21080 dial*
  - *21083-21086 –JT65 / JT9 / Experimental*
    - *21083 dial*
  - *21086-21089 – FT4*
    - *21086 dial*
  - *21089-21095 – FT8 Fox*
    - *21089 and 21092 dial*
  - *21096-21096.3 – WSPR (Existing)*
    - *21094.6 dial*
- **12M – 15kHz**
  - *24914-24920 – FT8 (relocate)*
    - *24914 & 24917 dial*
  - *24920-24923 – JT65/JT9/Experimental*
    - *24920 dial*
  - *24923-24926 – FT4 (DX Only)*
    - *24923 dial*
  - *24926-24926.3 – WSPR (existing)*
    - *24924.6 dial*
  - *24926-24929 – FT8 Fox*
    - *24926 dial or 24920 if more capacity required*
- **10M – 21kHz**
  - *28074-28083 – FT8*
    - *28074, 28077 & 28080 dial*
  - *28083-28086 - JT65/JT9/Experimental*
    - *28083 dial*
  - *28086-28089 – FT4*
    - *28086 dial*
  - *28089-28095 - FT8 Fox*
    - *28089 & 28092 dial*
  - *28126-28126.3 – WSPR (Existing)*
    - *28124.6 dial*