

# IDEAS FOR FUTURE RECEIVERS

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- 2 Back-ends, opacity and Radio Frequency Interferences
- 3 INAF receiver groups
- 4 Northern Cross
- 5 SRT for space applications

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- 8 International front-end projects: possible links with the Italian radio telescopes

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## CALL FOR IDEAS



### Ideas for future receivers for the Italian Radio Telescopes

----- TO BE FILLED WITHIN NOVEMBER 15th 2016 -----

#### Type \*

- Mono feed
- Multi feed
- Phased Array feed
- Other: \_\_\_\_\_

#### Central Frequency (MHz) \*

Your answer \_\_\_\_\_

#### International networks and projects

Please list and comment on international networks and/or large collaborations/projects for which the proposed receiver may be of interest (max 1000 characters)

Your answer \_\_\_\_\_

#### Receiver's details

#### Telescope(s) for which the receiver is proposed \*

- Medicina 32-m
- Noto
- SRT
- Northern Cross

#### Comments on the technical details

Please provide here comments on the technical details given above (max 1000 characters)

Your answer \_\_\_\_\_



## 15 ideas for new receivers

- Receivers expression of a large community
- Two projects submitted by non-INAF proposer



**widespread interest**



**interaction & synergies**



## 15 ideas for new receivers

- Low – Mid Frequency bands (< 18 GHz):

N. of ideas	Telescope(s)	Frequency (GHz)	BW (GHz)	Freq. Type	Feed Type
1	SRT	1.4	0.75	SF	S
1	SRT	5.0	1.4	SF	S
3	SRT (Med, Noto)	6.0	4	SF	PAF
1	SRT, Med, Noto	8.0	1.5-15	BB	S
1	SRT	2.3/8.4	0.16/0.8	DF	S
1	SRT	10	4.0	SF	S



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# 15 ideas for new receivers

- Low – Mid Frequency bands (< 18 GHz):

N. of ideas	Telescope(s)	Frequency (GHz)	Science Case	Type
1	SRT	1.4	Feedback and feeding mechanisms in low-P AGN.	S
1	SRT	5.0	Gas inflows and outflows (HI) associated to AGN.	S
3	SRT (Med, Noto)	6.0		AF
1	SRT, Med, Noto	8.0		S
1	SRT	2.3/8.0	AGN sub-kpc jet physics and magnetic fields.	S
1	SRT	10		S

• Feedback and feeding mechanisms in low-P AGN.

• Gas inflows and outflows (HI) associated to AGN.

• AGN sub-kpc jet physics and magnetic fields.



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## 15 ideas for new receivers

### GROUPING SIMILAR IDEAS:

➤ **3 x PAF @ 6 GHz**



## 15 ideas for new receivers

- Low – Mid Frequency bands (< 18 GHz):

N. of ideas	Telescope	Science	Type
1	SFR	• Diffuse emission in nearby galaxy clusters. Evolution in dense environments.	
1	SFR	• Mapping bright galactic extended sources (SNR, HII regions). Highly circularly polarized transients in the Galactic Centre.	
<b>3</b>	<b>SRT (Me...</b>		<b>F</b>
1	SRT, Me...	• C-band spectropolarimetric surveys. CMB foregrounds. GRB and GW events follow-ups. FRB search. Pulsars. SF regions	
1	SFR		
1	SFR		

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• Mapping bright galactic extended sources (SNR, HII regions). Highly circularly polarized transients in the Galactic Centre.

• C-band spectropolarimetric surveys. CMB foregrounds. GRB and GW events follow-ups. FRB search. Pulsars. SF regions



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## 15 ideas for new receivers

- High Frequency bands ( $> 18$  GHz):

N. of ideas	Telescope(s)	Frequency (GHz)	BW (GHz)	Freq. Type	Feed Type
1	SRT	8.4/32	2.0	DF	-
1	Noto	43	10.0	SF	D
1	Med, Noto, SRT	22/43/90	8/17/30	MF	S
2	SRT	100	$\leq 30.0$	SF	M
1	SRT	90	20.0	DF	M



## 15 ideas for new receivers

### GROUPING SIMILAR IDEAS:

- **3 x PAF @ 6 GHz**
- **2.3/8.4 GHz + 8.4/32 GHz** triple-frequency, coaxial



## 15 ideas for new receivers

N. of ideas	Telescope(s)	Frequen (GHz)
1	SRT	8.4/32
1	SRT	2.3/8.4

- Geodetic VLBI for: ICRF, ITRF, EOP, crustal deformations, WV content, etc.
- Radio science for solar system bodies: gravity fields, atmospheres/ionospheres and surfaces. Solar wind, corona and magnetic field. Tests of General Relativity.
- Deep Space Tracking.



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1	SRT	8.4/32	2.0	DF	-
1	Noto	43	10.0	SF	D
1	Med, Noto, SRT	22/43/90	8/17/30	MF	S
<b>2</b>	<b>SRT</b>	<b>100</b>	<b><math>\leq 30.0</math></b>	<b>SF</b>	<b>M</b>
1	SRT	90	20.0	DF	M



## 15 ideas for new receivers

### GROUPING SIMILAR IDEAS:

- **3 x PAF @ 6 GHz**
- **2.3/8.4 GHz + 8.4/32 GHz** triple-frequency, coaxial
- **2 x multi-feed @ 100 GHz**



## 15 ideas for new receivers

- High Frequency

N. of ideas	Telescope
1	SR
1	Note
1	Med, Note
<b>2</b>	<b>SR</b>
1	SR

- Mapping ISM molecular content in galaxies. Gas/dust scaling relations as local benchmarks in future SKA studies.
- Gas-dust ISM filaments: mapping molecular transitions in the Galactic plane.
- Complex organic molecules in the Galaxy. Chemistry in molecular clouds. Multi-line CH<sub>3</sub>OH masers in massive SF regions.
- Wide community of proposers.

Type
-
D
S
<b>M</b>
M



## 15 ideas for new receivers

- High Frequency bands (> 18 GHz):

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1	SRT	8.4/32	2.0	DF	-
1	Noto	43	10.0	SF	D
<b>1</b>	<b>Med, Noto, SRT</b>	<b>22/43/90</b>	<b>8/17/30</b>	<b>MF</b>	<b>S</b>
2	SRT	100	≤ 30.0	SF	M
1	SRT	90	20.0	DF	M



## 15 ideas for new receivers

### GROUPING SIMILAR IDEAS:

➤ **43 GHz dual feed + 22/43/90 GHz**

A dual-feed, multi-frequency receiver



## 15 ideas for new receivers

### GROUPING SIMILAR IDEAS:

- **43 GHz dual feed + 22/43/90 GHz**

A dual-feed, multi-frequency receiver

**\*CHALLENGING!\***



15 ideas

- High Frequency

N. of ideas	Telescope
1	SRT
1	Not
1	Med, Not
2	SRT
1	SRT

- Galaxy SF and gas dynamics in extragalactic sources (H<sub>2</sub>O, SiO, CO). Maser emission. Recombination lines.
- Strong collaboration with AGILE, Fermi, MAGIC, CTA: SD survey/monitor + VLBI on peculiar and variable objects. SMBHs, origin of high energy emission. SD+VLBI to disentangle the contribution from very compact and more diffuse regions (e.g. star-burst or AGN).
- Emission mechanisms in SgrA\* and low luminosity AGN. Transients.  $\gamma$ -ray flares.
- Very wide community of proposers.



## 15 ideas for new receivers

- High Frequency band

N. of ideas	Telescope(s)	Frequ (GHz)
1	SRT	8.4/3
1	Noto	43
1	Med, Noto, SRT	22/43/
2	SRT	100
<b>1</b>	<b>SRT</b>	<b>90</b>

- Dual color bolometer.
- Dust emission in interstellar clouds and protostars: hydrodynamic collapse of protostellar envelopes, gas flows.
- SFR at high redshift via free-free and dust emission.
- SZ effect: cluster structure; cluster detection at high z.



## 15 ideas for new receivers

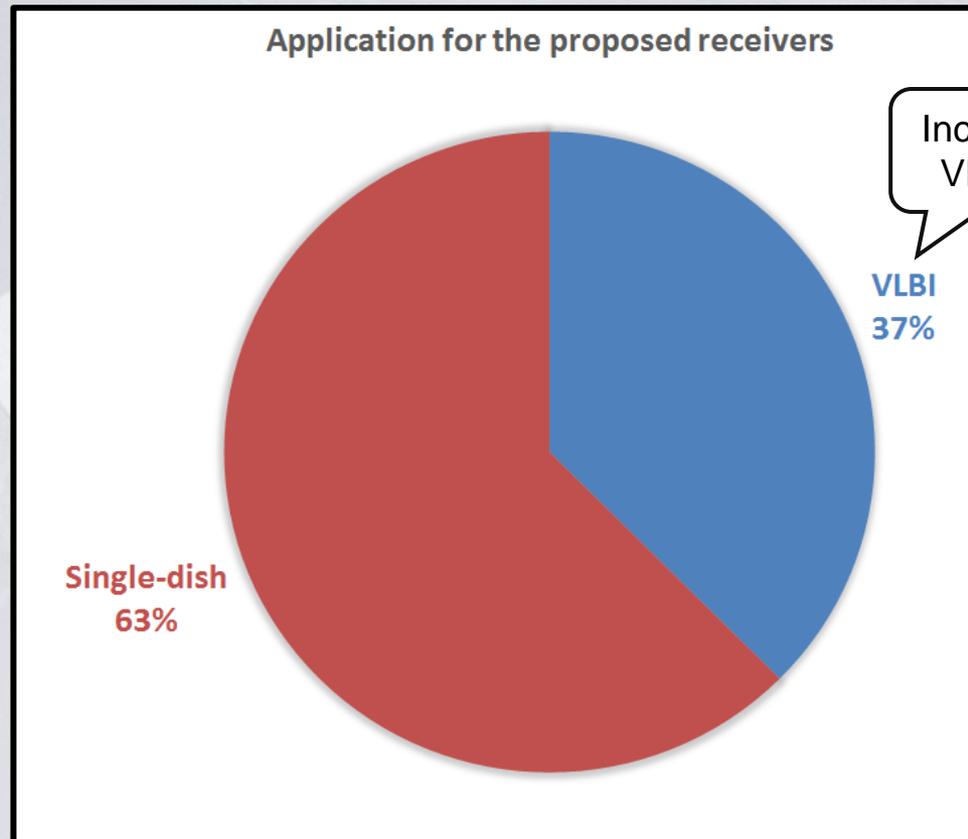
- Super Resolution receiver

N. of ideas	Telescope(s)	Frequency (GHz)
1	Med, SRT	22

- Super-resolution beyond the classical diffraction limit via variable transmittance filters.
- improve the angular resolution of the telescope/receiver system on compact (not pointlike) or extended bright sources.
- no counterpart on any other telescope (radio or otherwise).
- development of devices using meta-materials.

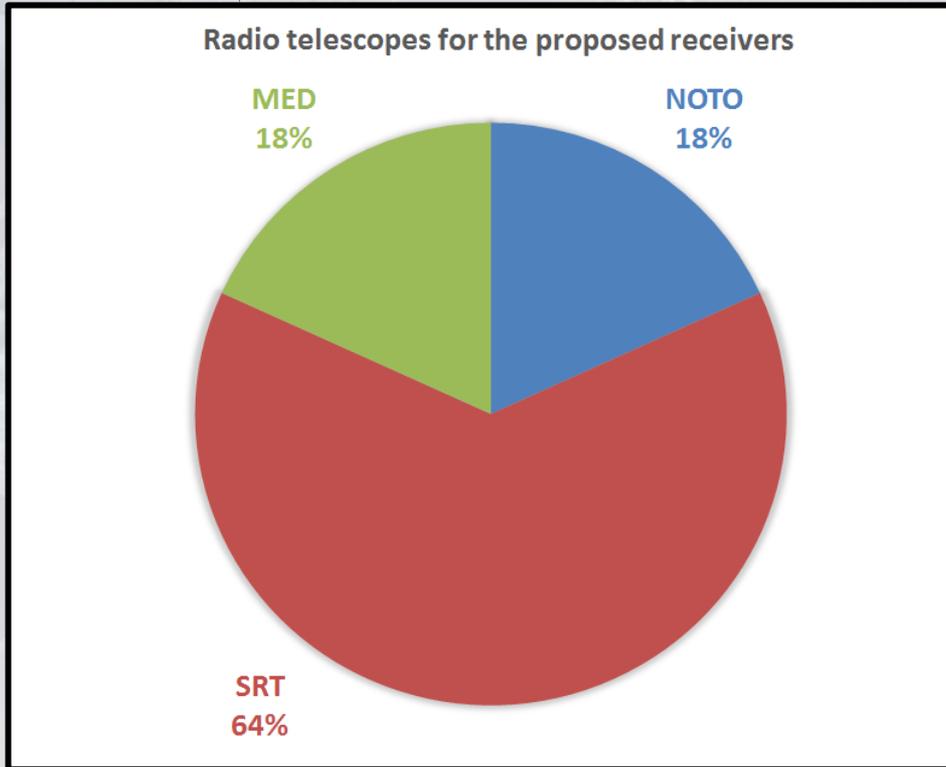


## 15 ideas for new receivers





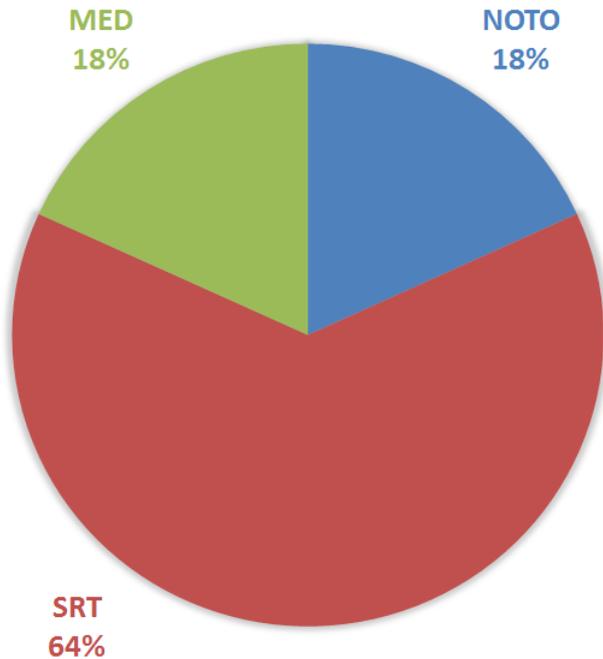
## 15 ideas for new receivers



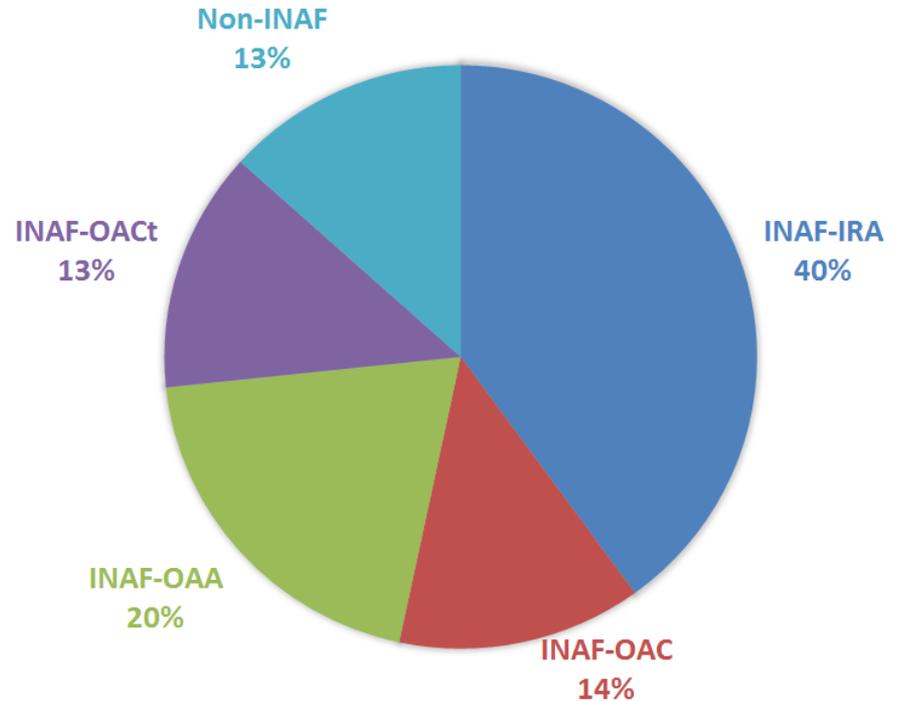


## 15 ideas for new receivers

Radio telescopes for the proposed receivers

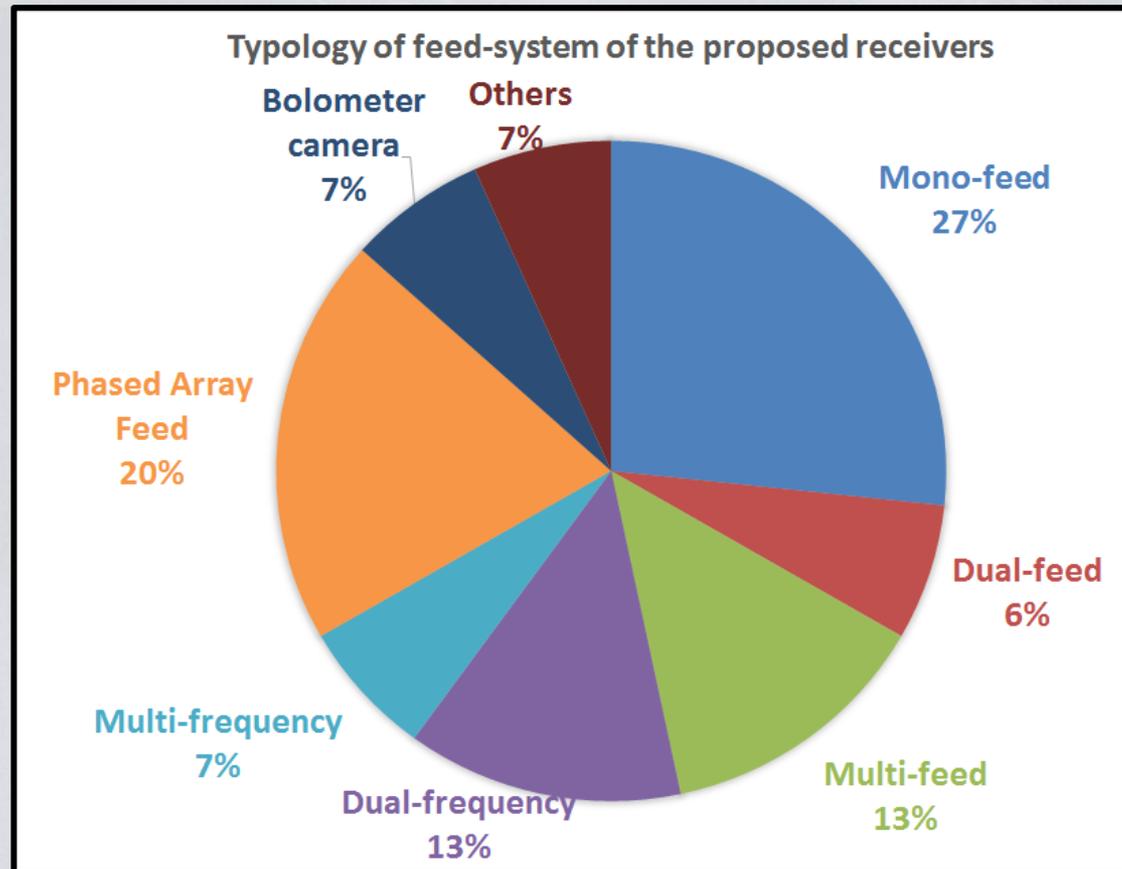


Affiliation of the PI of the proposed receivers



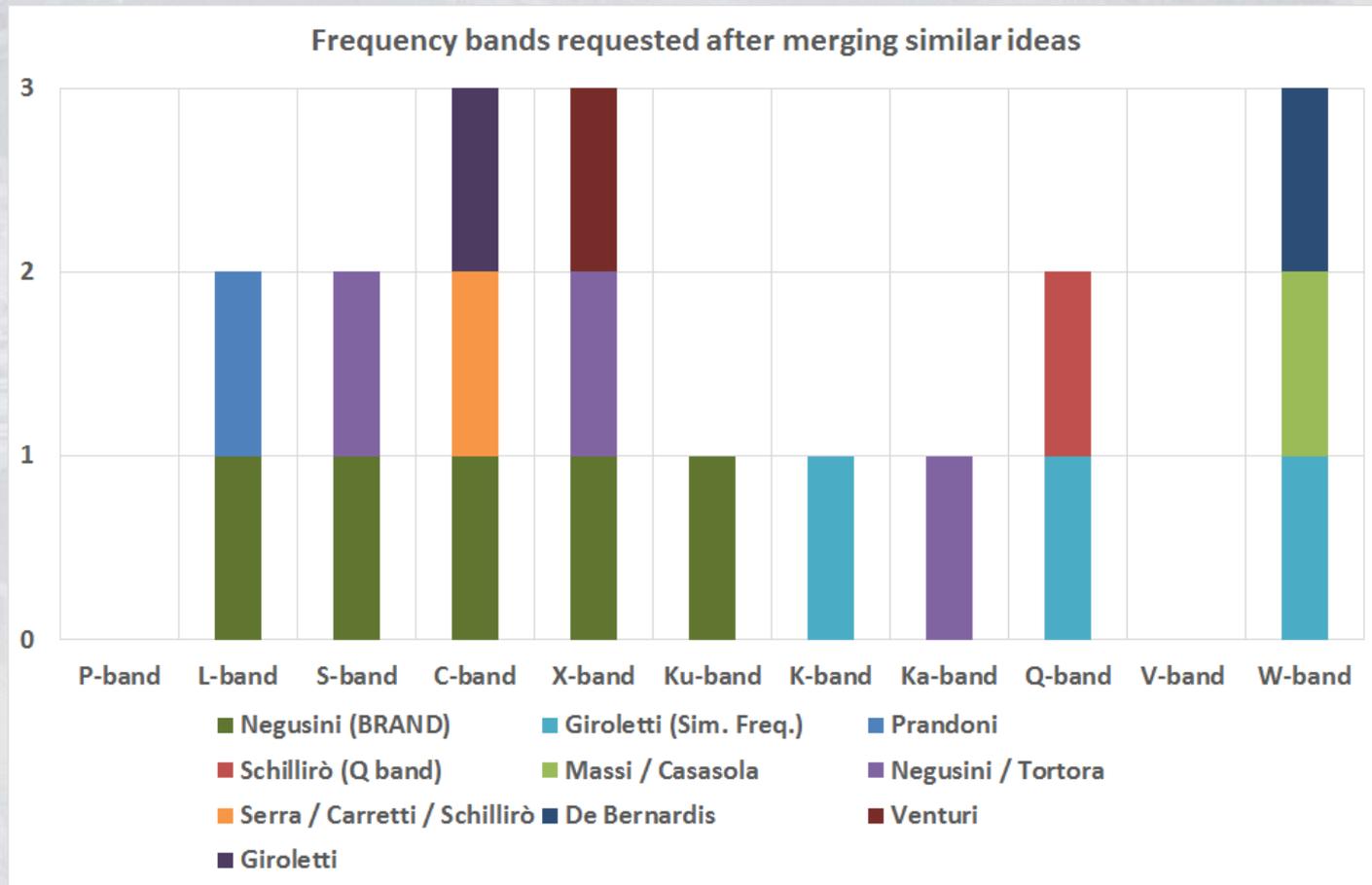


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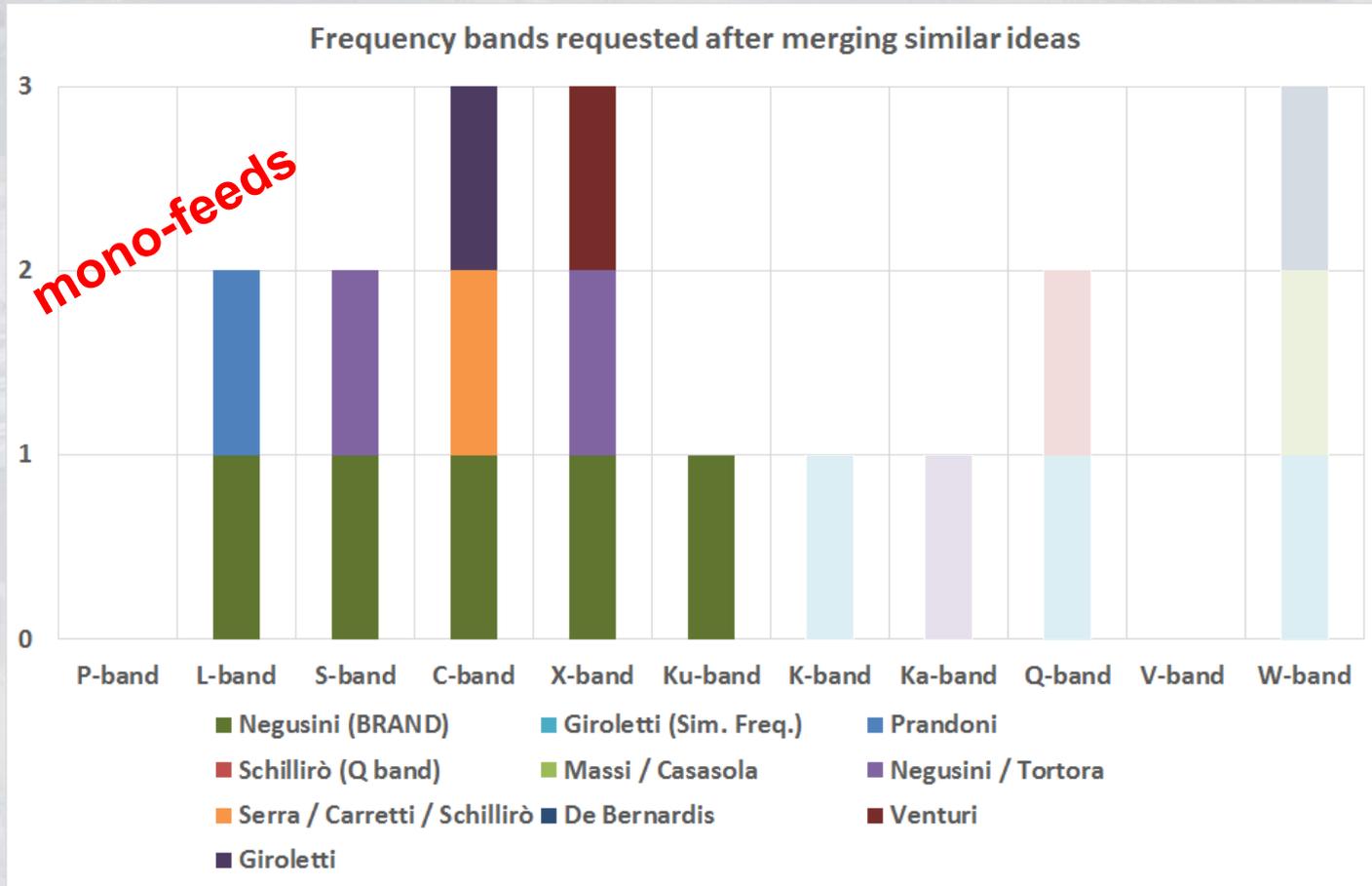


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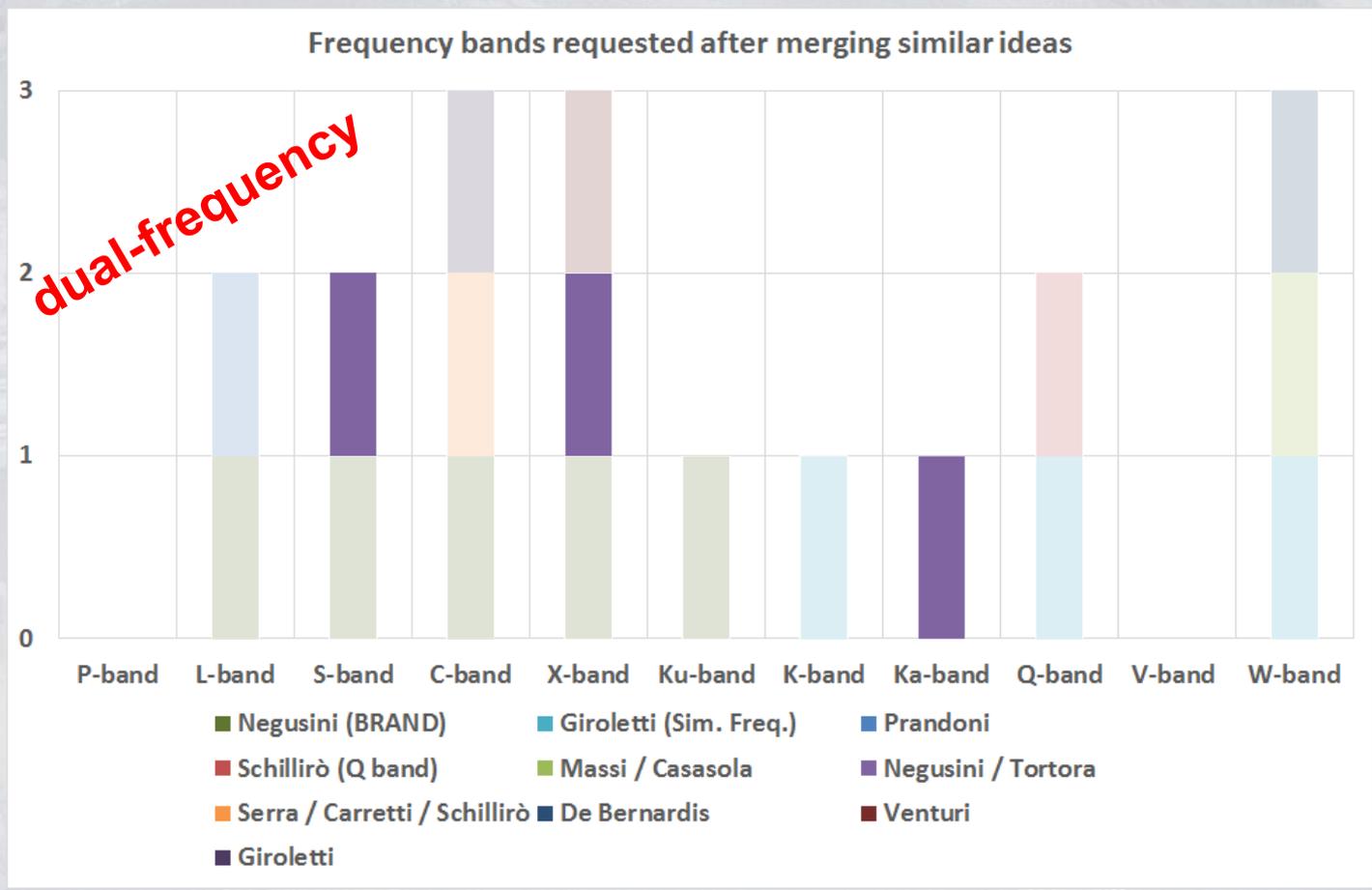


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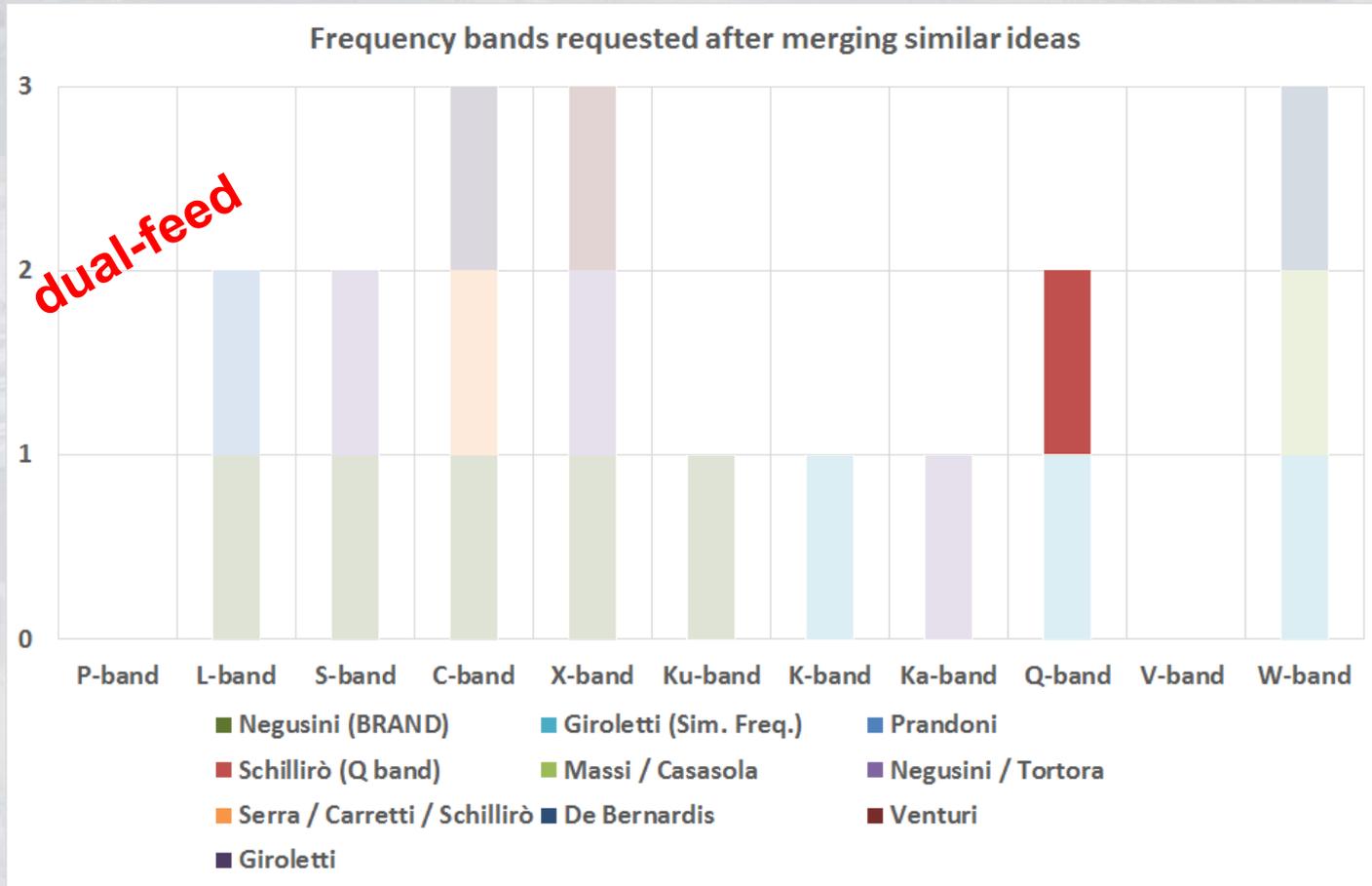


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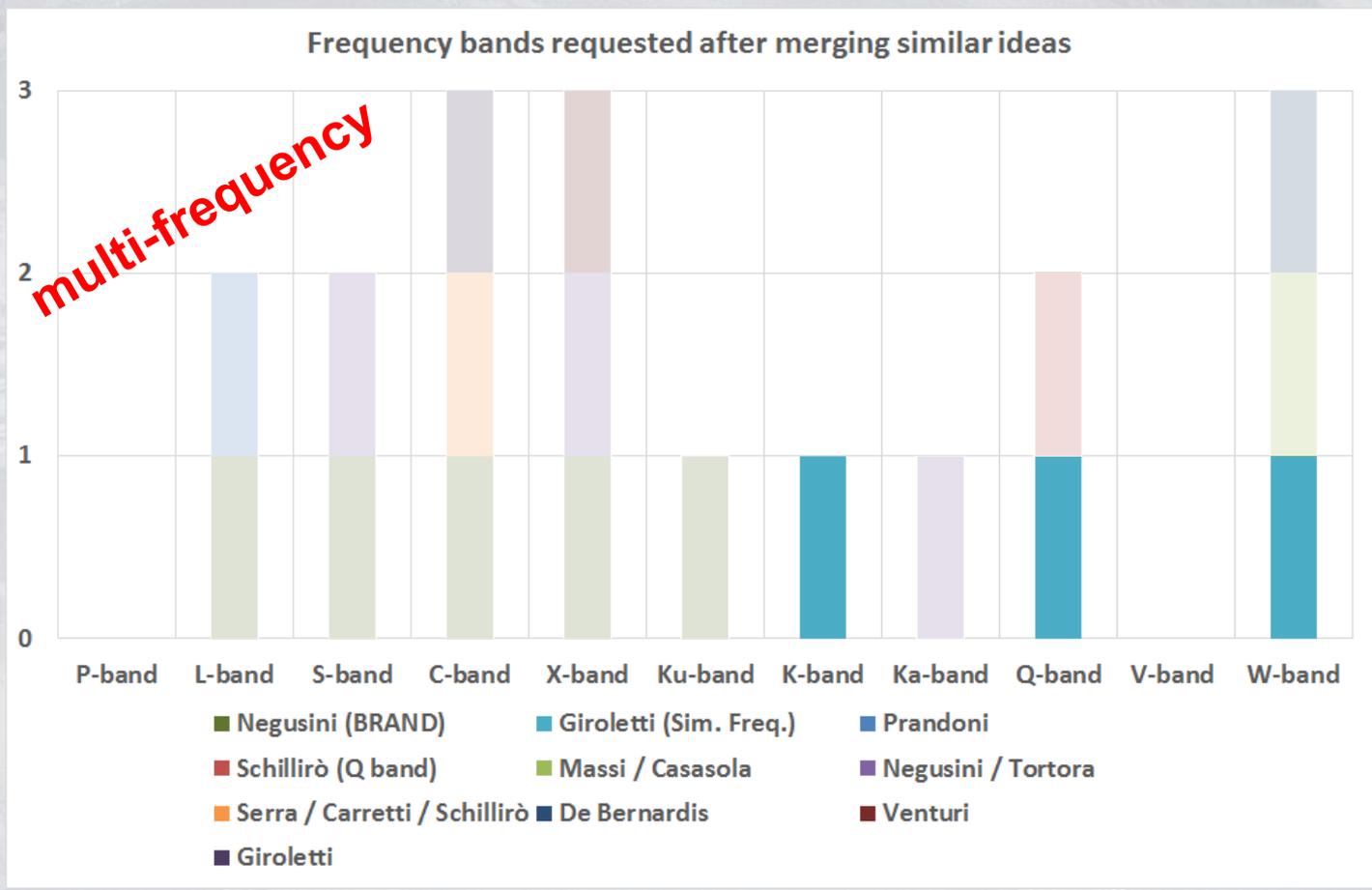


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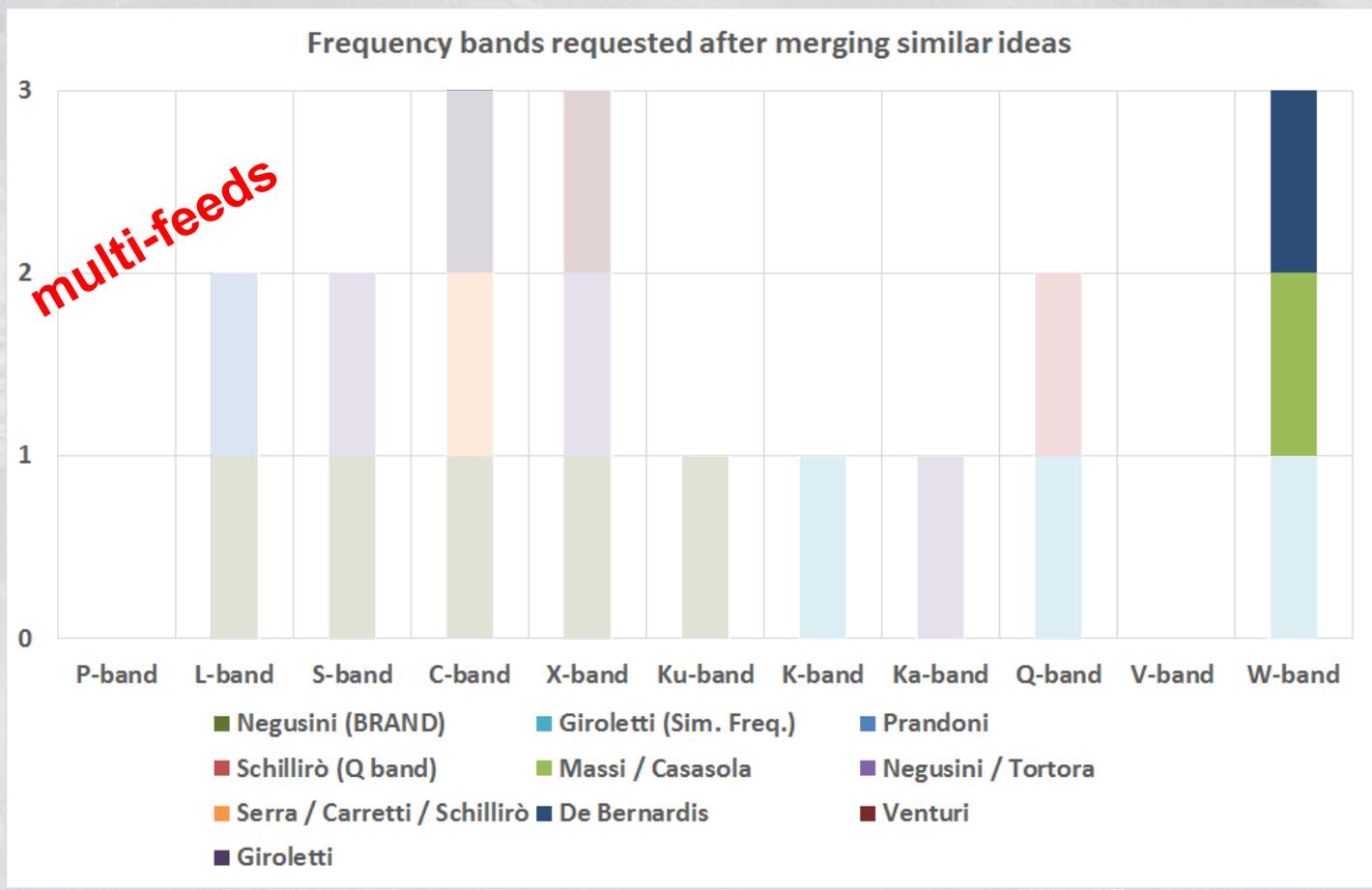


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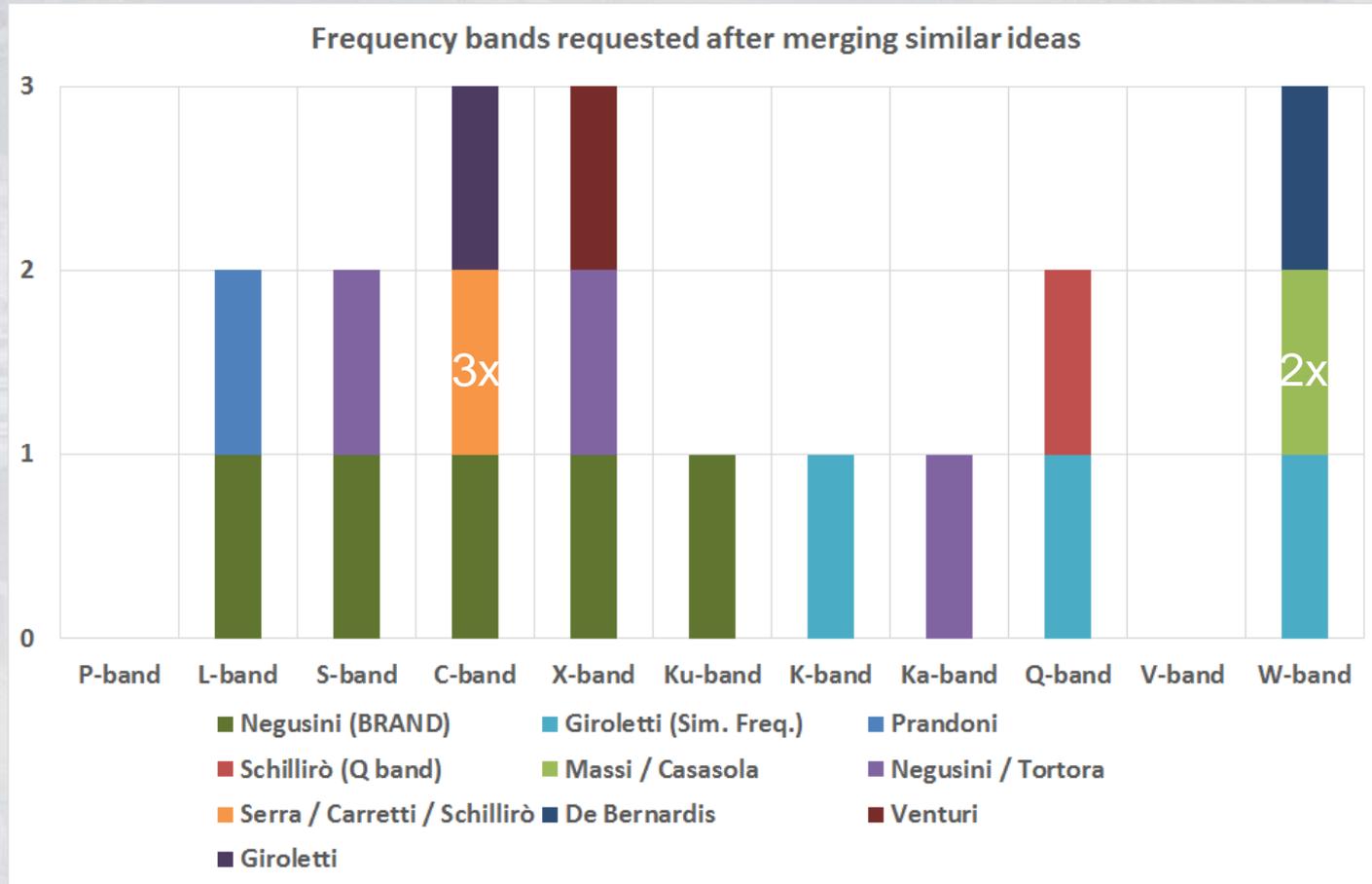


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