



# **RAYNET Technology Survey**

***Greg Mossop G0DUB***



# **The CoM Action**

**Provide strategic technical direction on the following:-**

**-PMR (both analogue and digital);**

**-Amateur radio;**

**-High-speed data (both amateur and commercial)"**



## **What we did...**

**Survey form constructed and issued to all Network Groups. Interim report fed back to 2016 AGM.**

**Survey form repeated to RSGB Groups closing in February 2017.**

**It wasn't perfect....**



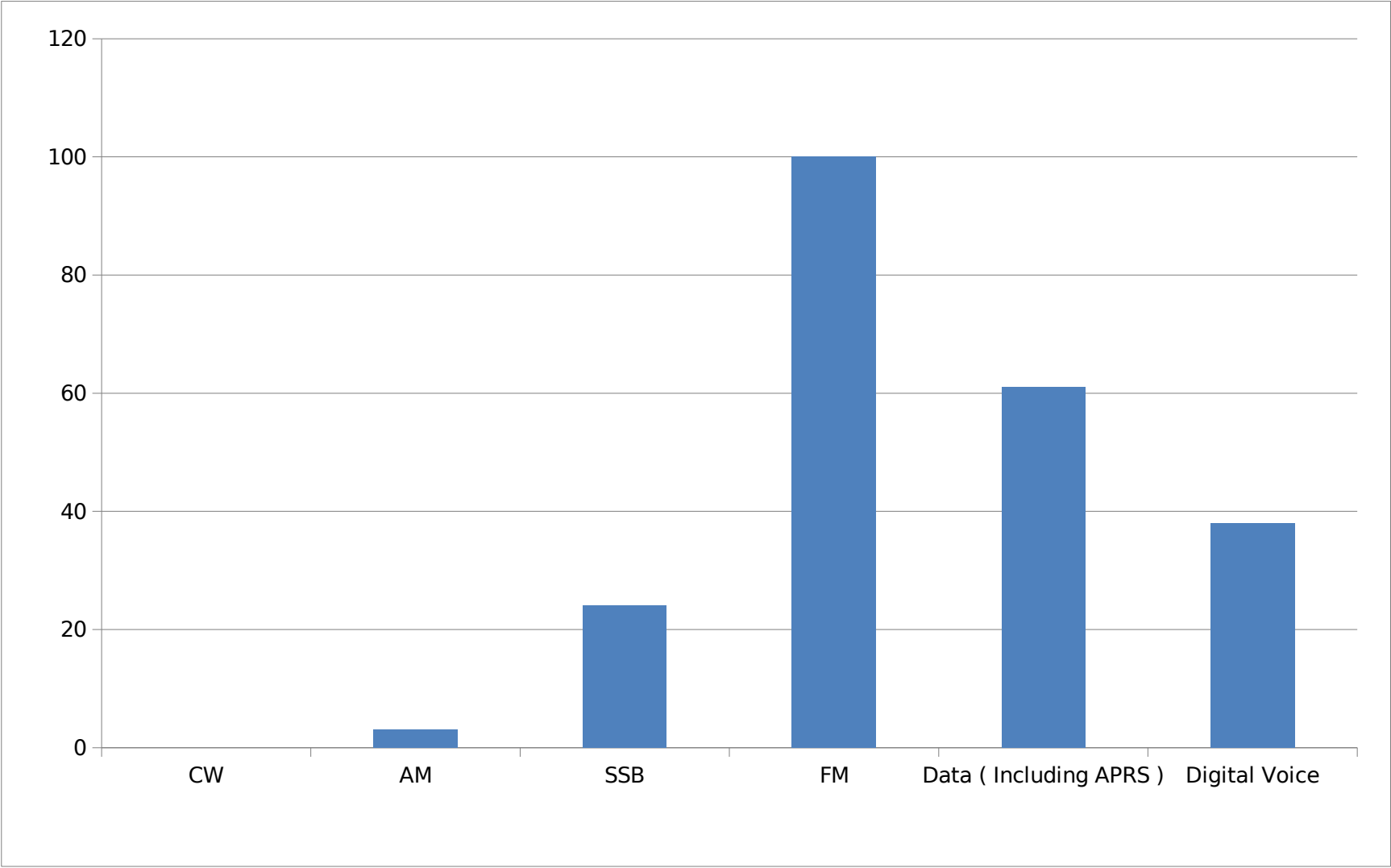
# **The results.**

**100 responses analysed for today's presentation.**

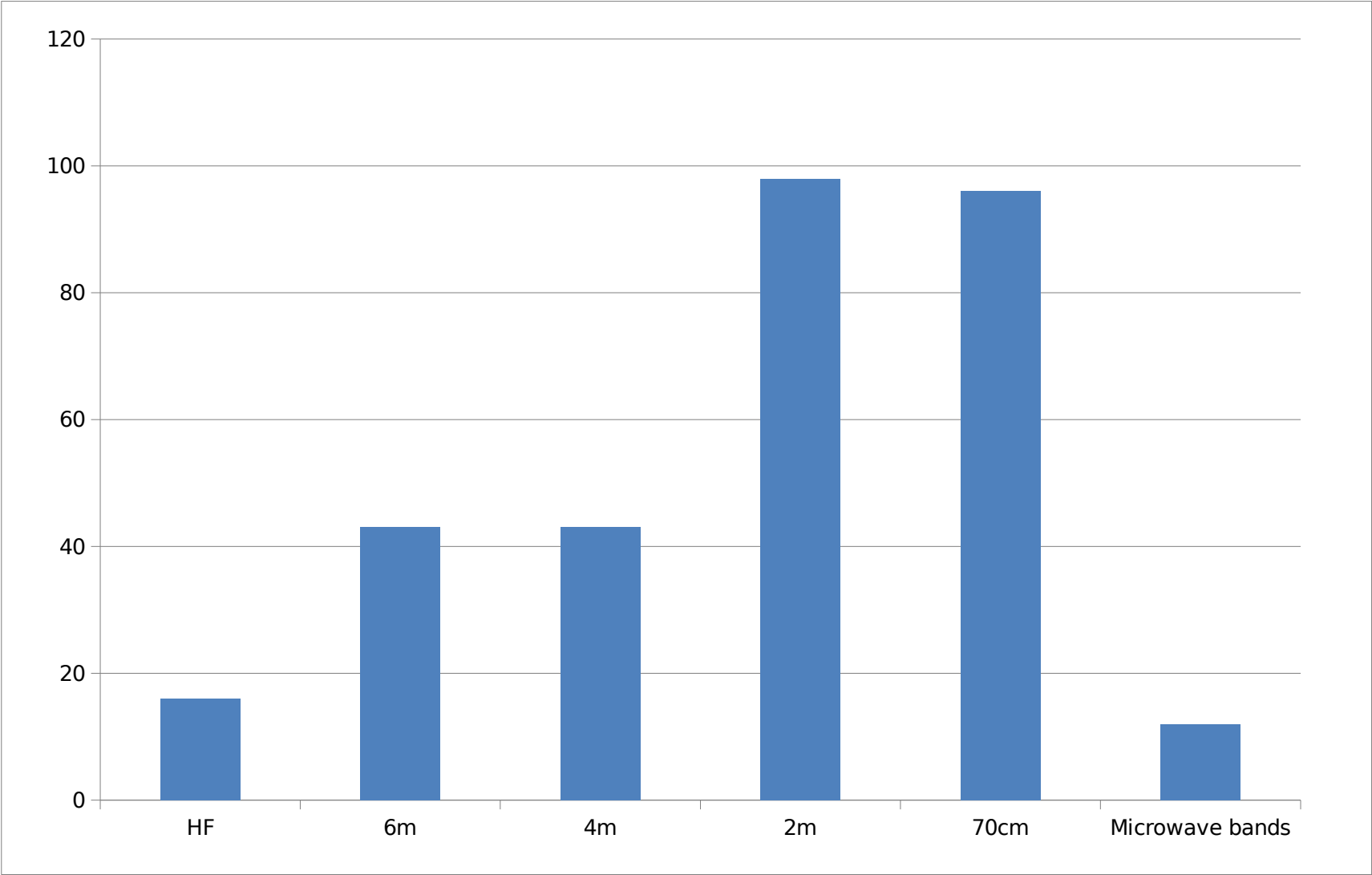
**8 responses deleted as 'spoiled', three duplicate entries also removed.**

**A good mix of urban , rural and 'remote' groups.**

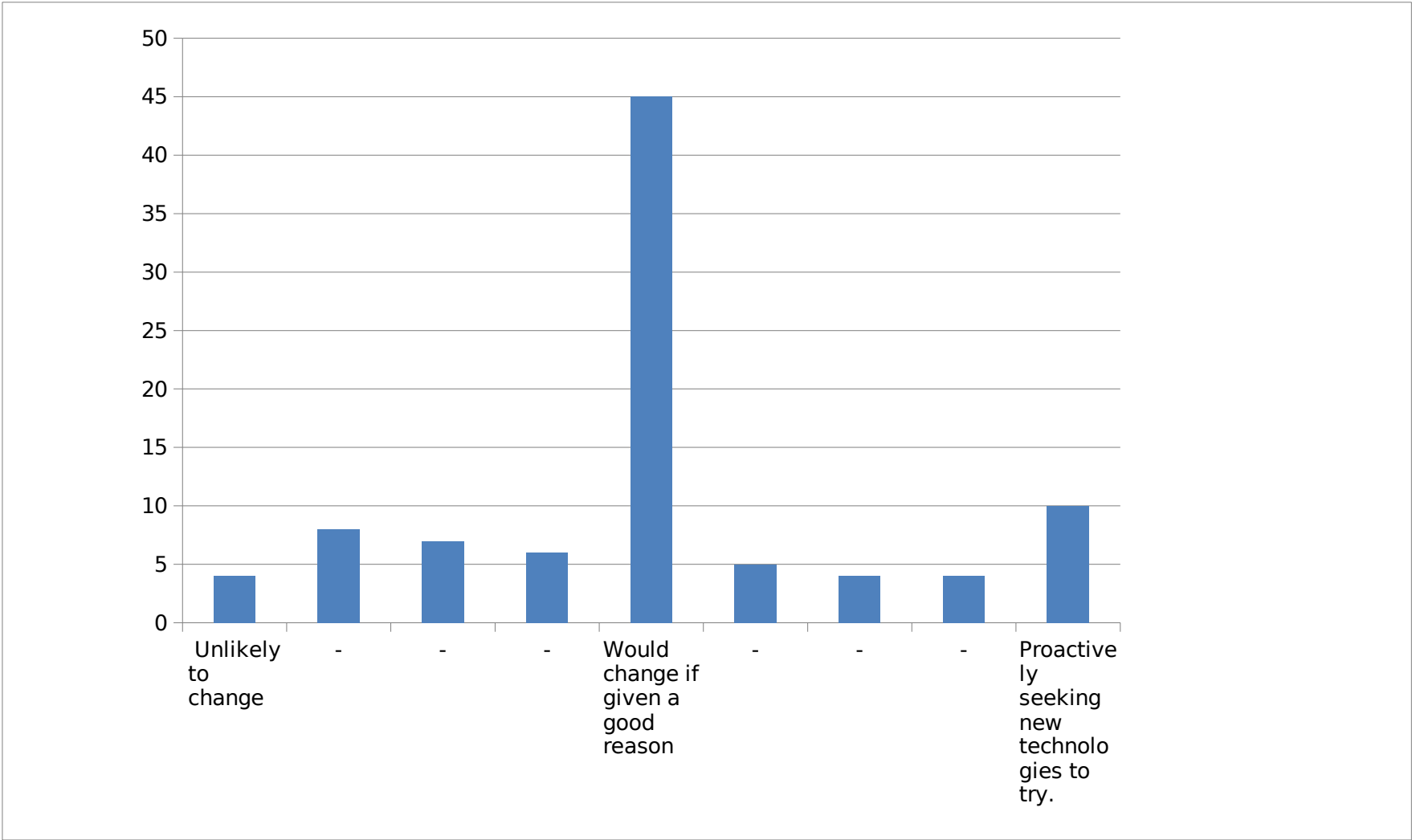
Q4: What modes does your RAYNET group use ( select all that apply ) ?



Q8: What bands does your RAYNET Group use ( select all that apply ) ?



**Q31: How receptive do you think your group is to new modes ( purely subjective question )?**




### Q32: What do you think the barriers are to change?





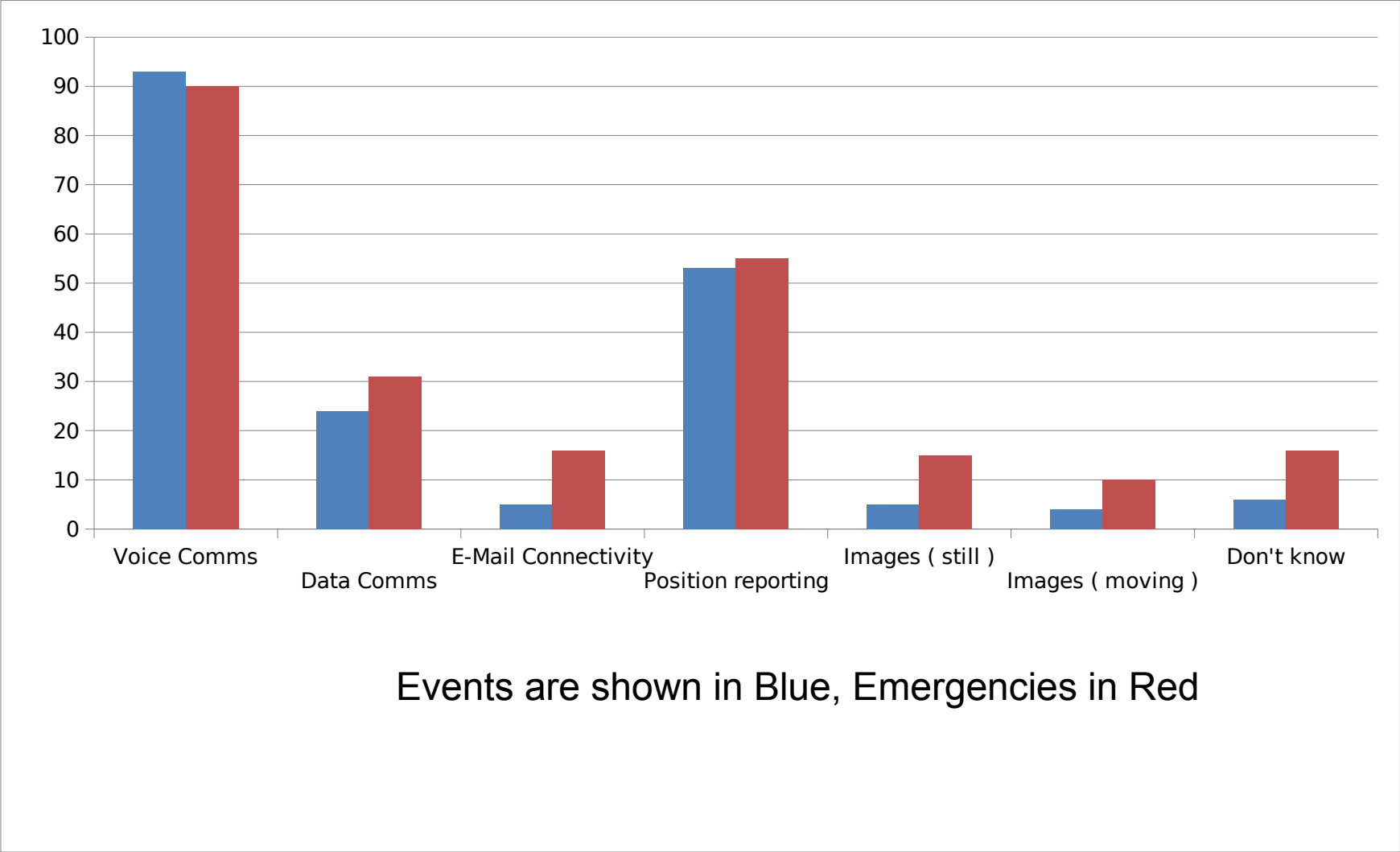


# So if we had requirements?

RAYNET REQUIREMENTS SPECIFICATION	
	Prepared By: _____ Checked By: _____ Approved for issue: _____

Number	Title	Requirement	Justification	Priority	Objective	Threshold	Verification Criteria	Remarks
Int.1	Independence of Networks	"such networks be robust, flexible and independent of other telecommunications services and capable of operating from emergency power"	ITU R-1042-2		Full network operation with no dependency on Internet or mains power systems.	Able to operate a voice network for 4 hours continuously or longer by pre-arranged sked according to incident battle rhythm.		Links to compliance with Nat.1 -Nat.4
Int. 2	Interoperability of networks	Able to render aid/assistance to overseas countries by message relay.	IARU/ITU/IFRC MoU		Common message handling procedures able to transfer messages in any language.	Able to transfer messages using the latin alphabet.	Participation in GlobalSET exercises	Also able to be demonstrated by participation in regular message handling nets.
Nat.1	No notice failure of public telephony provider	Loss of service for 100k people for 5 hours	National Risk Register H40		Provision of communications to all User Service Specified locations	Provision of baseline communications between User Service Gold Commands		Delivered at Group/County/Zone level but has anyone actually asked what locations are required to be served?

# Q16/17: What do your User Services expect you to provide on events/emergencies?





# What have others found?

Perceived Functionality Requirements	2009	2014
Voice	87.5%	100%
Images	49%	44%
Video Streaming (live)	47%	19%
GIS	76%	88%
Access information via the internet	61%	88%
Access information on Incident Management System	65%	75%



# **The requirements?**

**Should be traceable to a standard, a risk register or a defined need.**

**Should be realistic and scalable to allow groups to grow into them.**

**Should be equipment/software/operating system agnostic as far as possible.**



## For example...

### **Independence of Networks.**

**ITU Recommendation ITU R-1042-3 on Amateur Radio and Disaster Communications “be robust, flexible and independent of other telecommunications services and capable of operating from emergency power”.**

**Threshold target – Voice network for 4 hours continuous on emergency power.**

**Objective target – Full network operation with no dependency on internet or mains power systems.**



# For example...

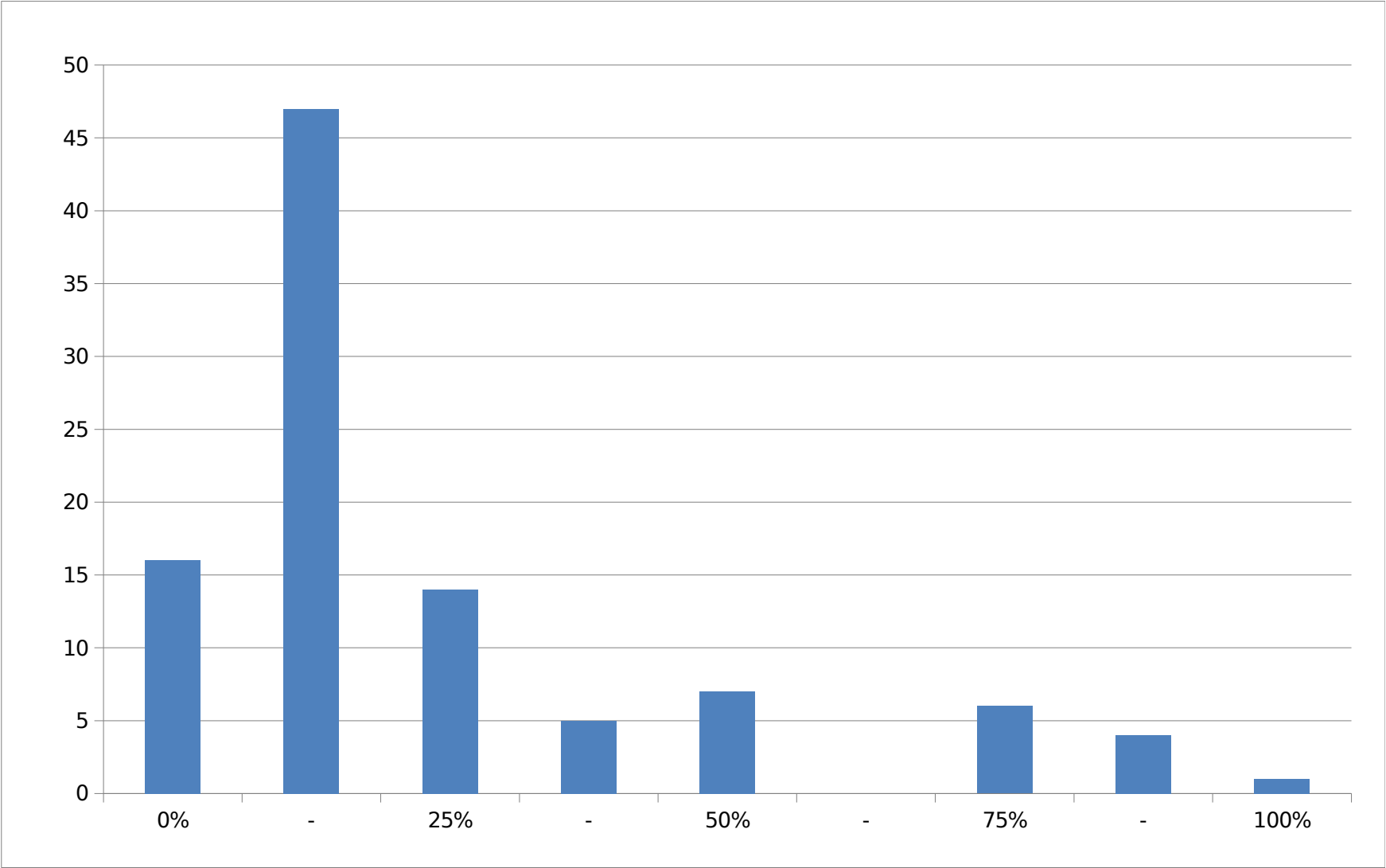
**Secure Voice Communications.**

**Encryption of Voice messages when required by a Senior User Service Officer ( UK Amateur Licence )**

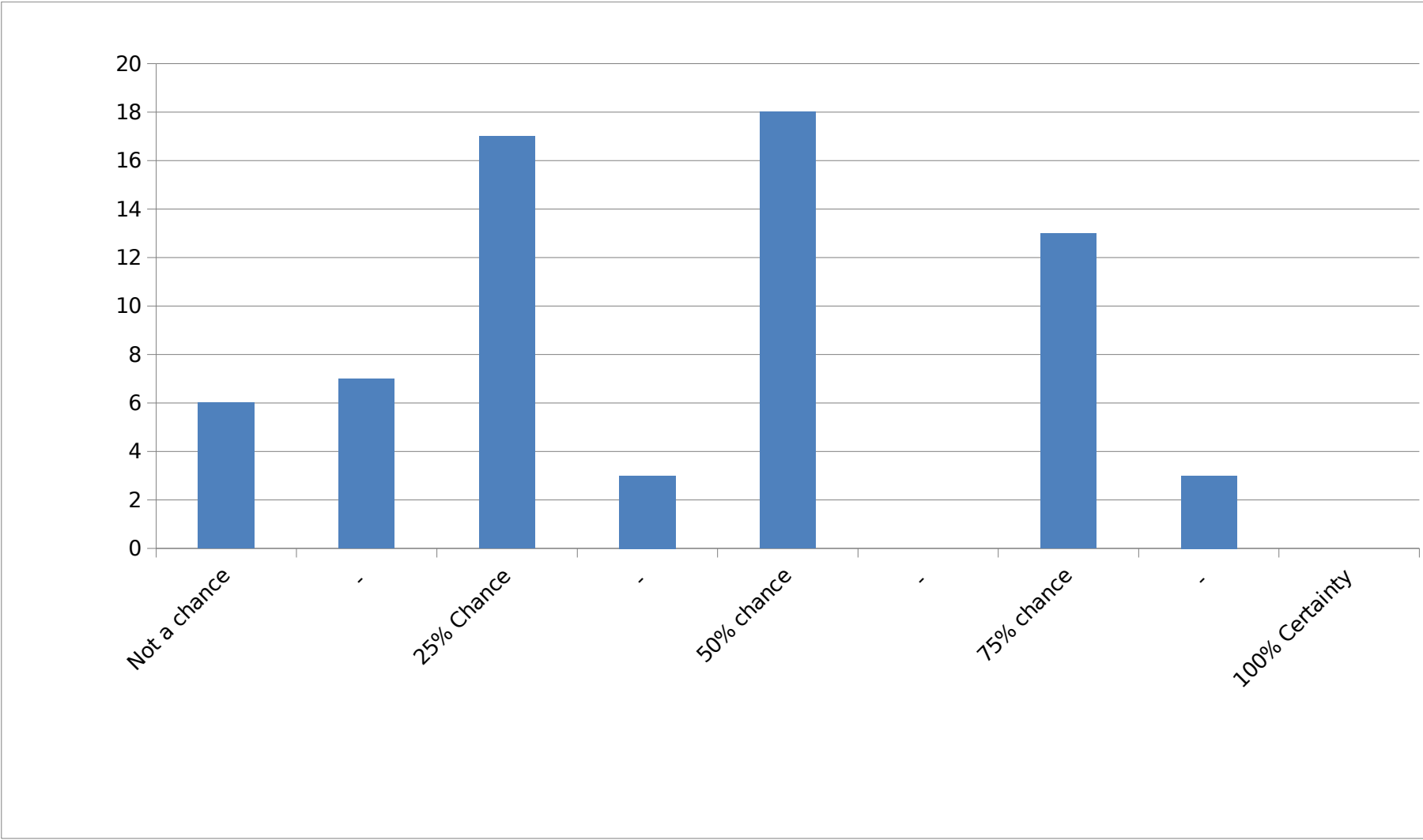
**Threshold target – 128 bit encryption using Motorola DMR units.**

**Objective target – AES256 bit encryption using Motorola DMR units.**

# Q7: What percentage of your members have digital voice capability ?

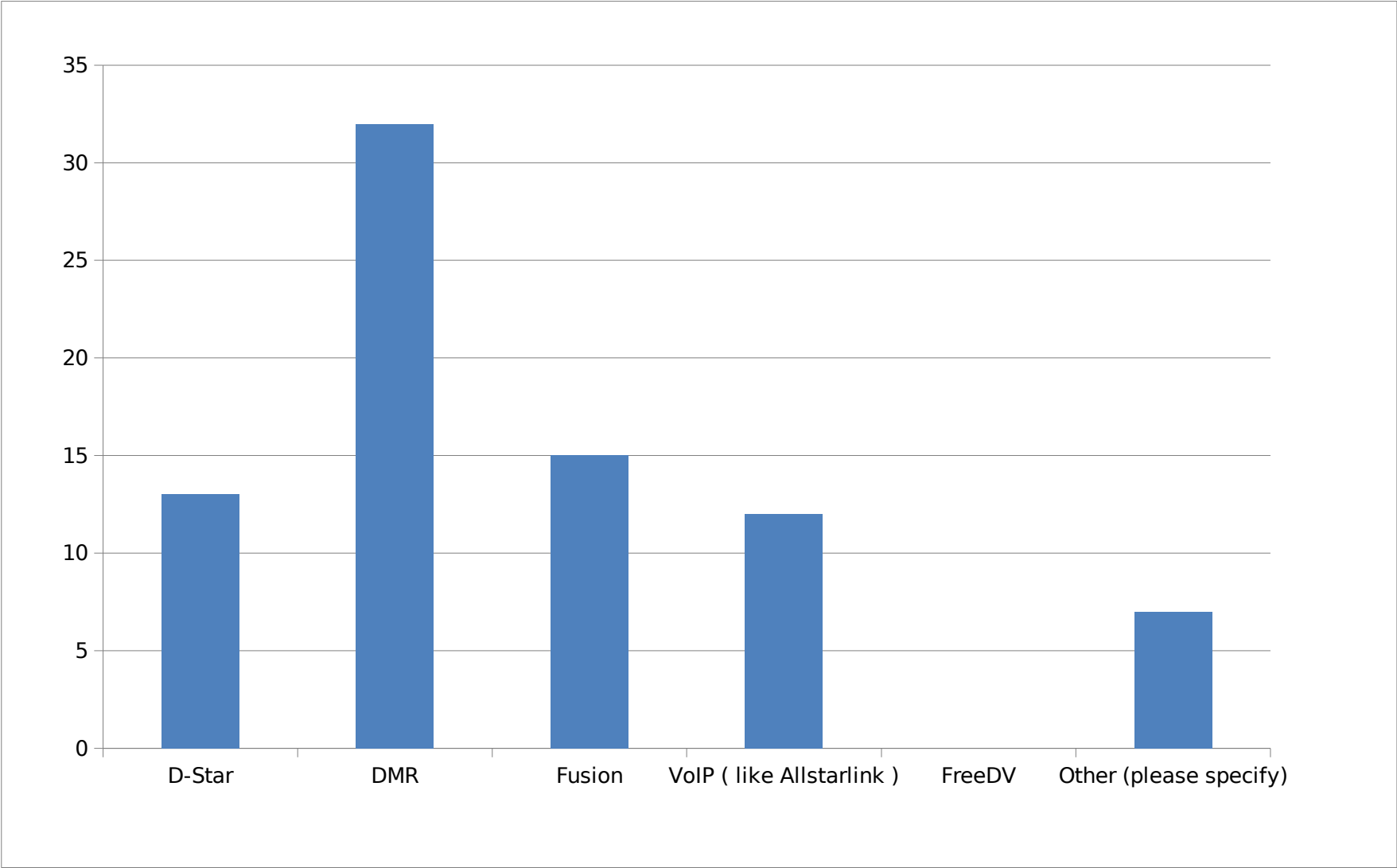


**Q5: If not using digital voice, how likely are you to be using it in 5 years time?**





**Q6: If you use Digital Voice, what mode(s) do you use ( select all that apply )?**





# Everything has to be justified

**Not many User Services know how to recognise an Encrypted Voice transmission, but....**

**DMR has encryption built in, but every supplier can implement it differently.**

**D-Star and Fusion don't have it at all being Amateur Service standards.**

**There needs to be a grown up conversation about how much is needed within in each group and apply the rule of three's.**



# Rule of Three?

**An American Amateur Service Emergency Communications Organisation said that a well rounded group would have;**

**Three operators who could do CW**

**Three operators who could do SSB**

**Three operators who could do data modes...**

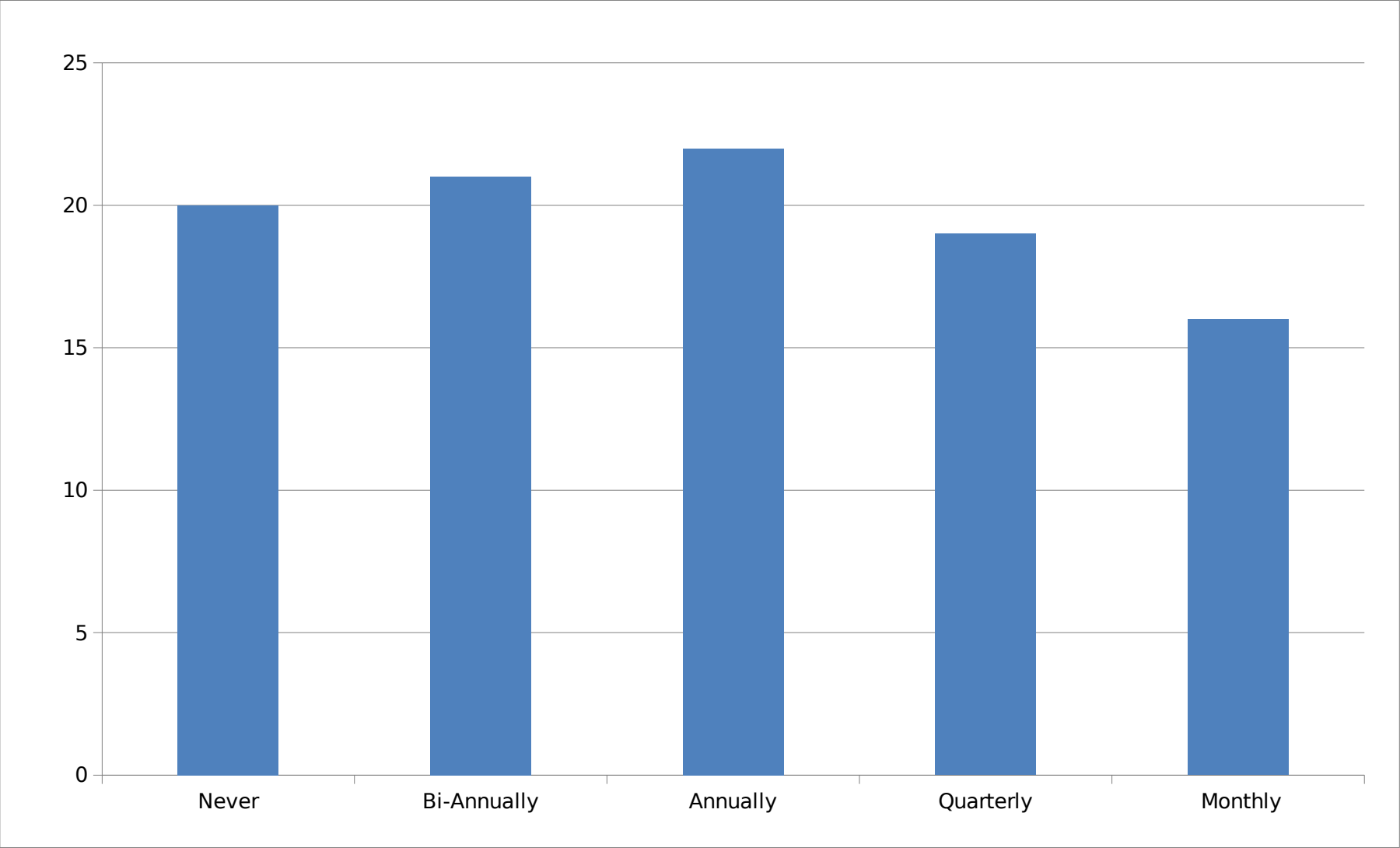
**Resilience against sickness, absence or changing requirements.**



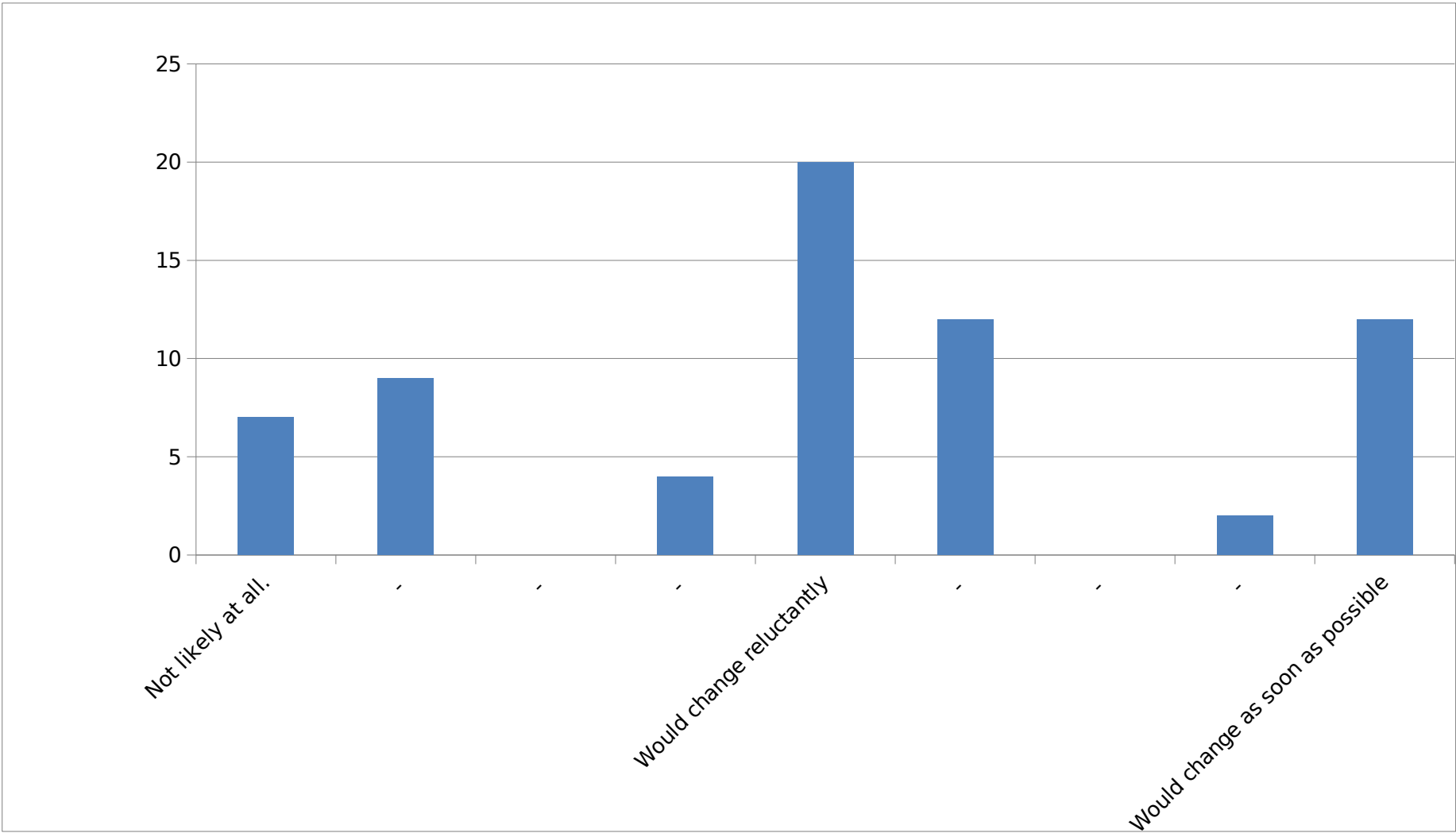
**We can be an integrated net.**

Human interface					
Pen and Paper	SMTP/ Email-like Client				
	Airmail	<u>Flmsg/Flarq</u>	CAT5		
		<u>Fldigi</u>	BPQ Node	D-RATS	IEEE 802.n
CW/Voice	PACTOR	PSK Modes	AX25	<u>DStar</u>	
	TNC	<u>Soundcard</u>	TNC	Dedicated Radio	
HF		VHF/UHF			Microwave

**Q9: How frequently does your group practice formal message handling on any amateur mode?**



**Q33: If a national standard was adopted that was not your current usage, how likely are you to adopt it?**





## **Amateur Service Only?**

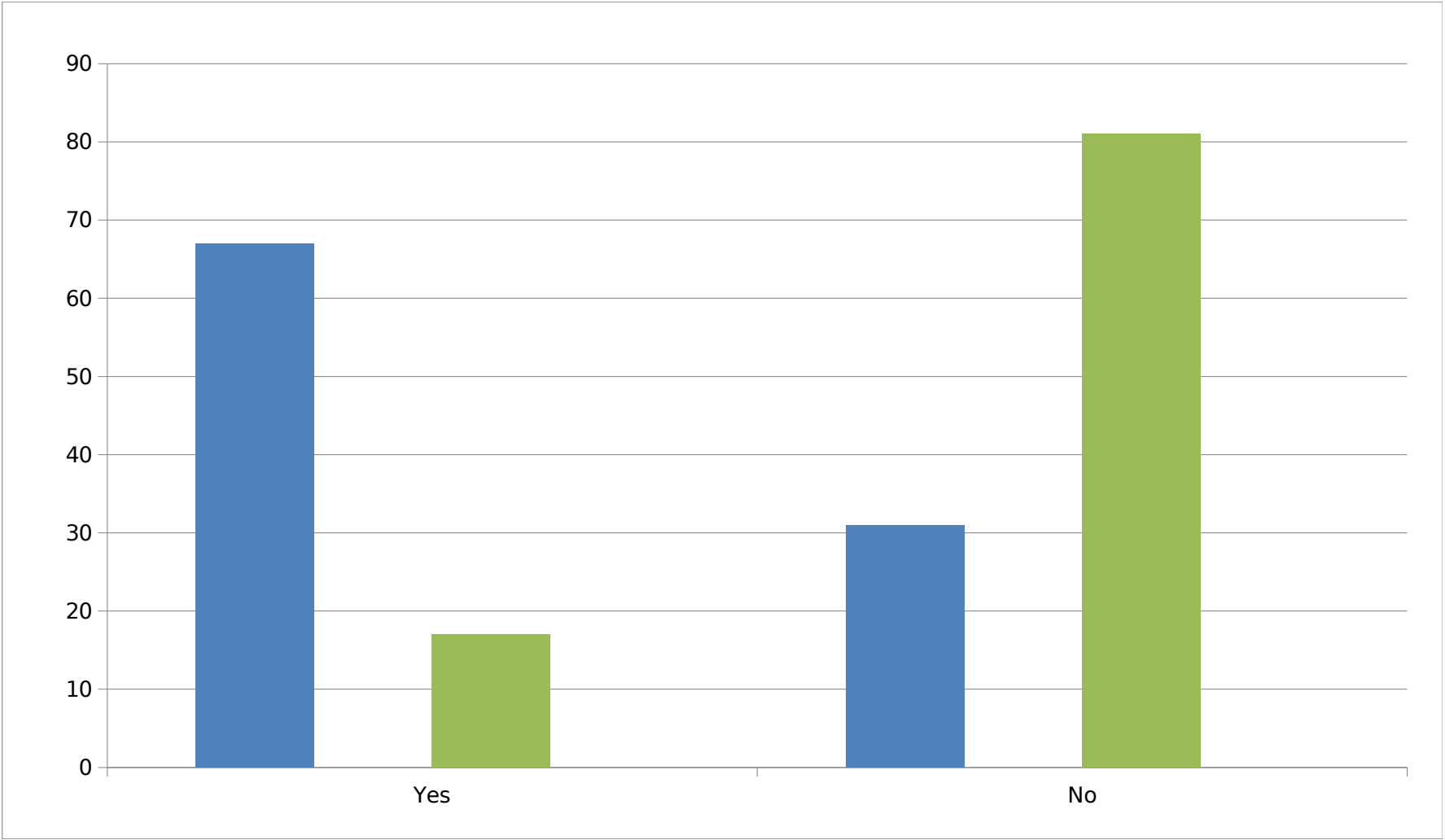
**Provided that our core requirements of independence and interoperability are met, are we restricted to Amateur Service Frequencies only?**

**No.... but.....**

**What about the costs ?**

**How do we manage interfaces?**

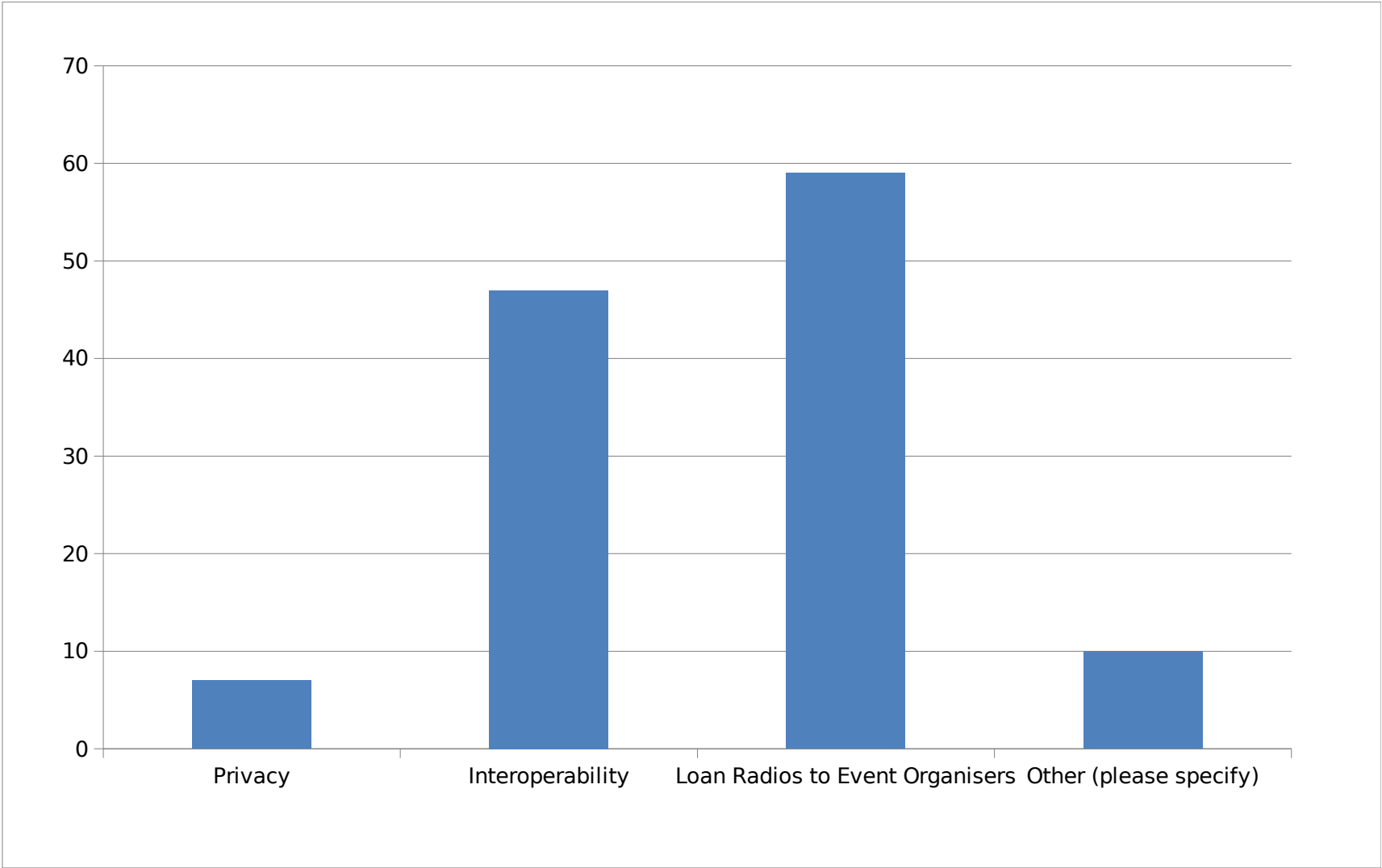
Q10/11: Do you use Analogue/Digital PMR on RAYNET Events?



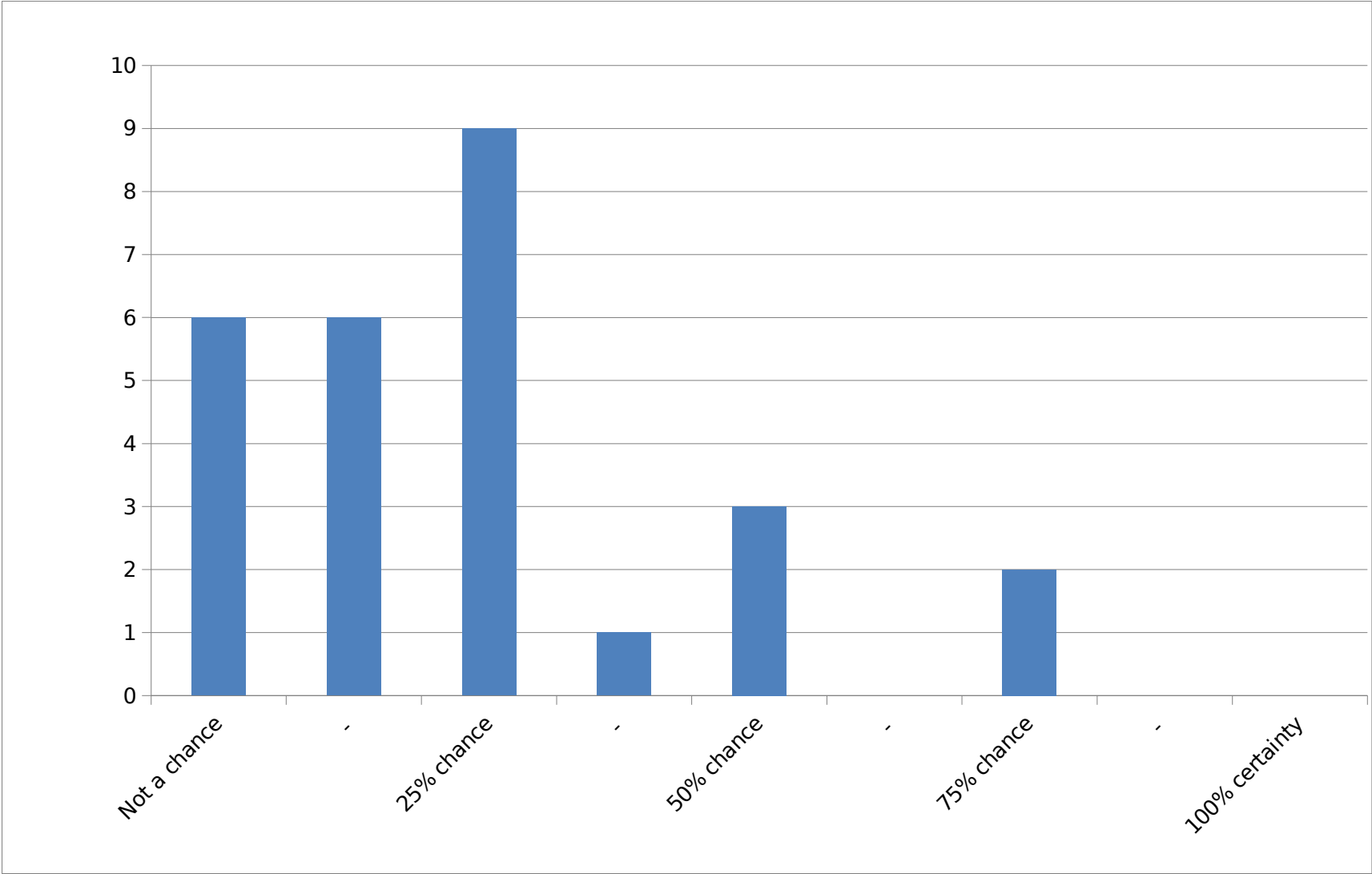
Blue – Analogue Green - Digital



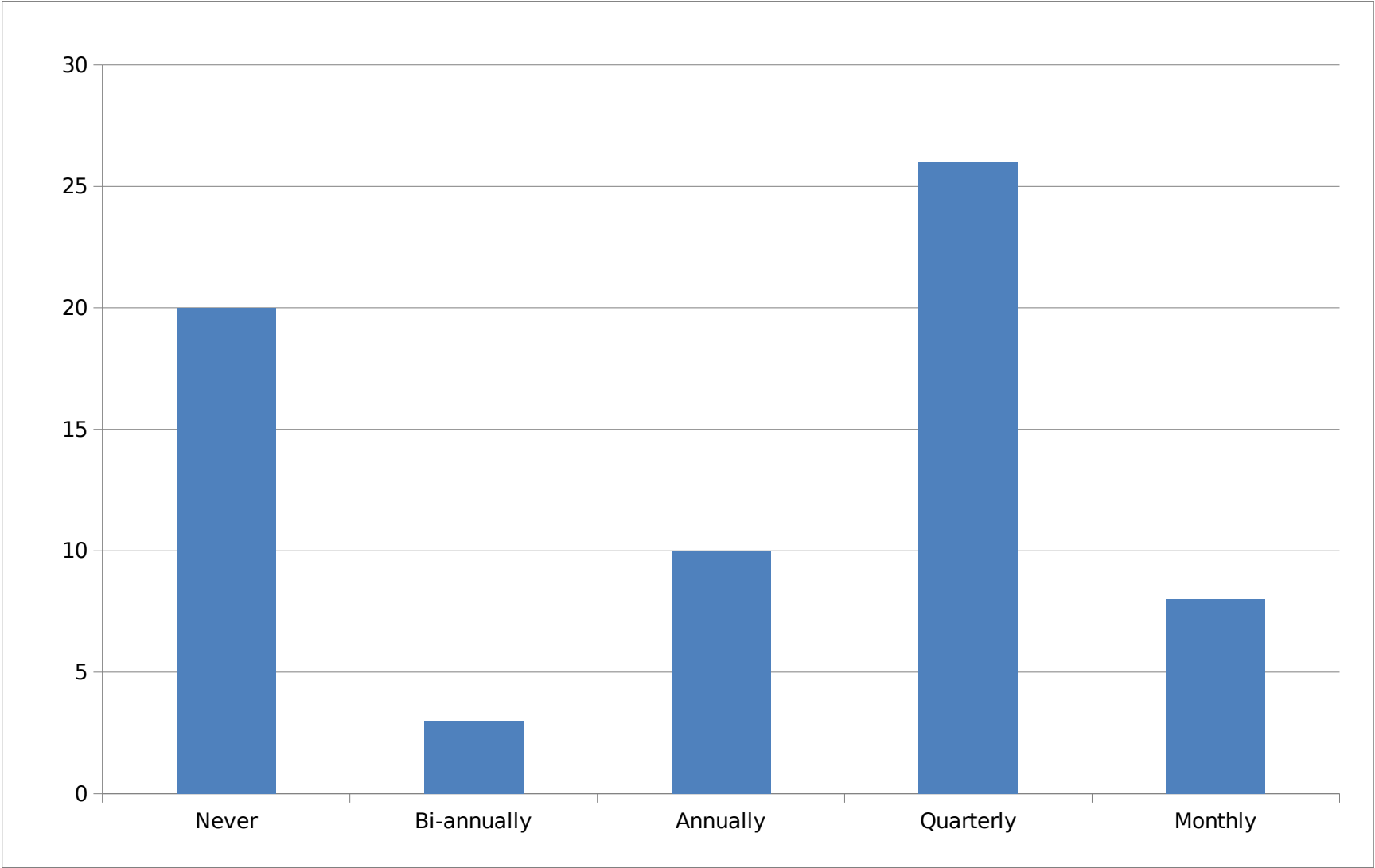
# Q14: What do you use PMR for?



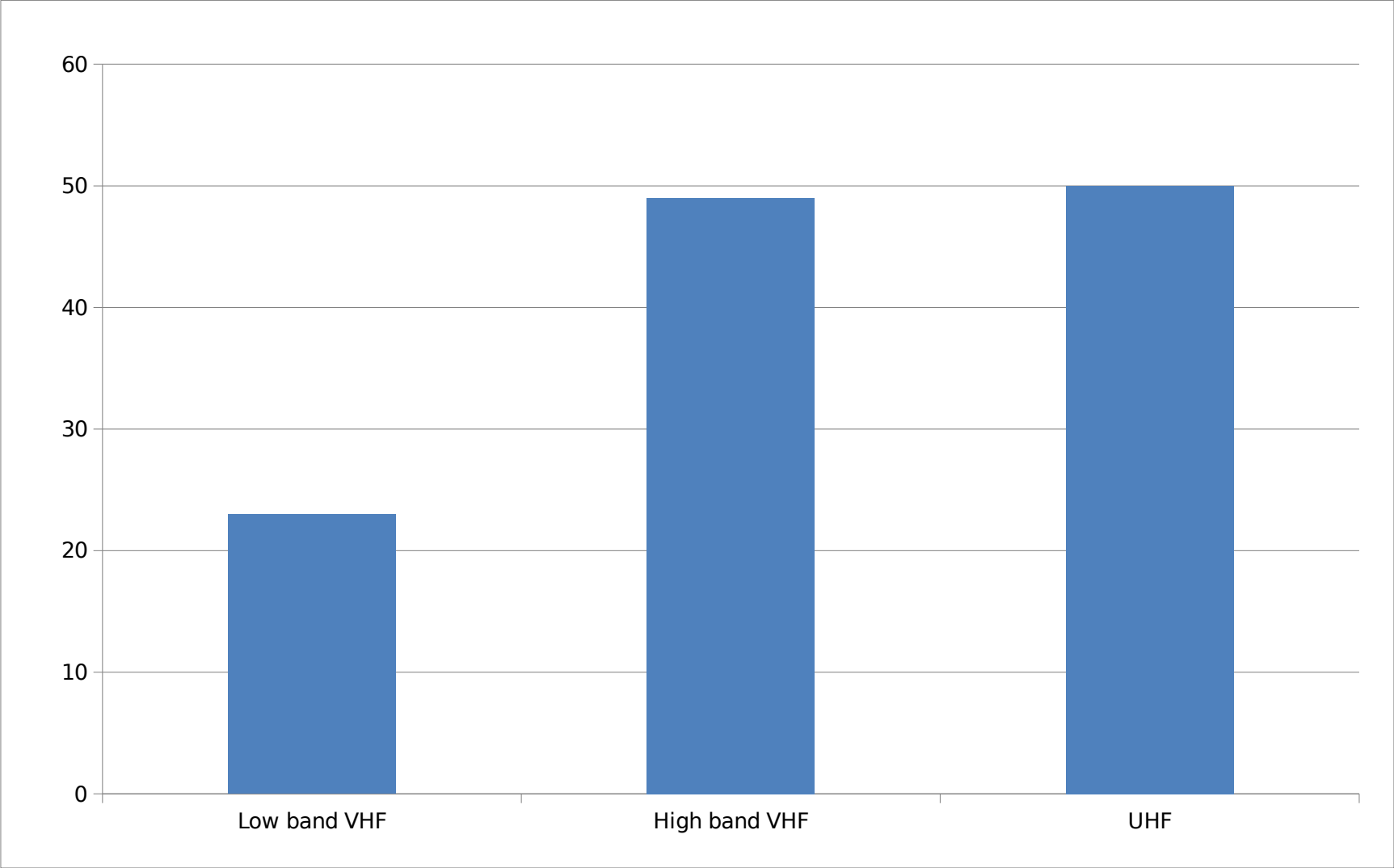
**Q12: If you don't use PMR how likely are you to be using it in 5 years time?**



# Q15: How frequently does your Group practice with the use of PMR radios?



# Q13: What PMR bands do you use?





## **Too much talk...**

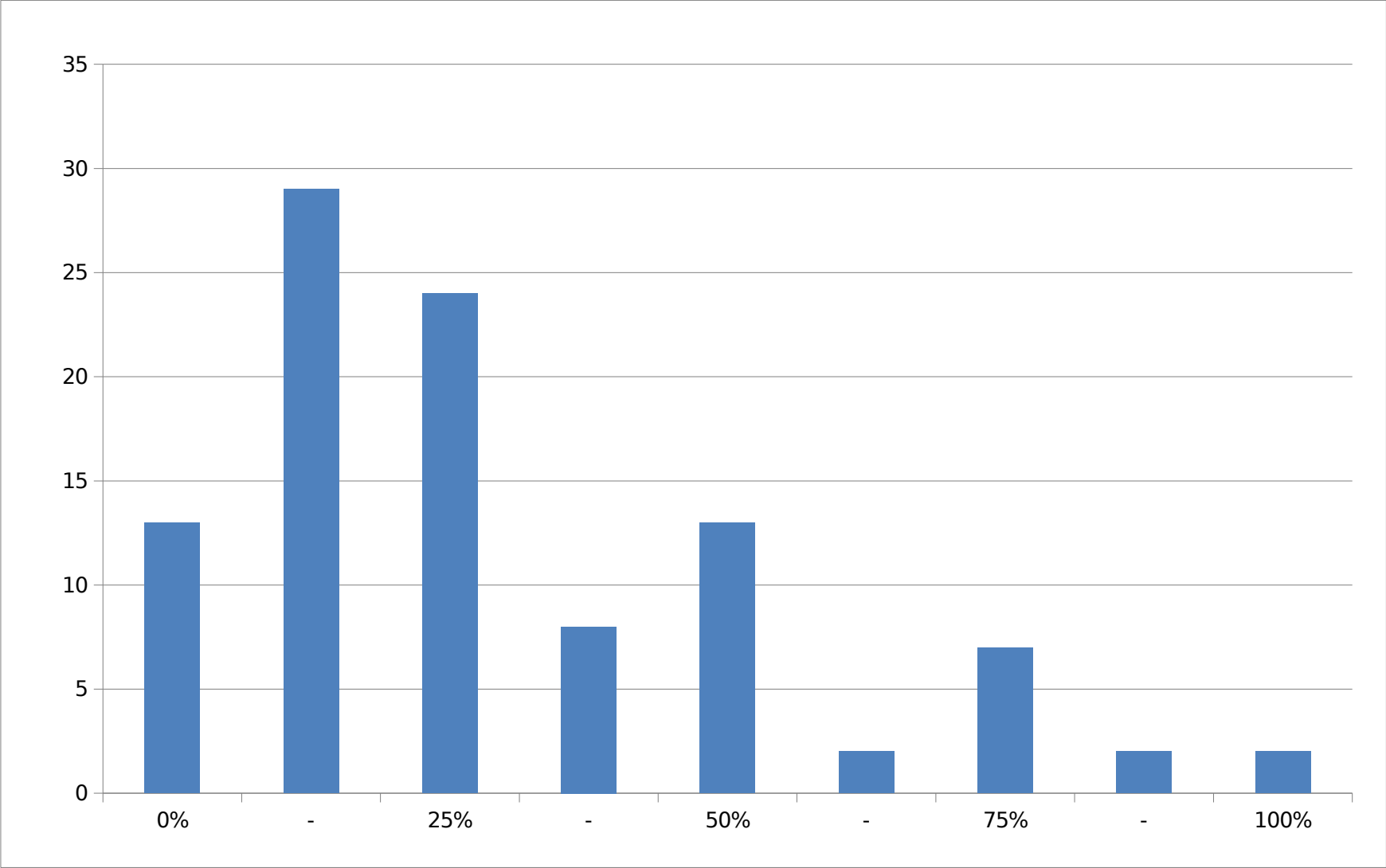
**A lot of focus so far on voice modes, what about data?**

**Data is cool, Data is what people want?**

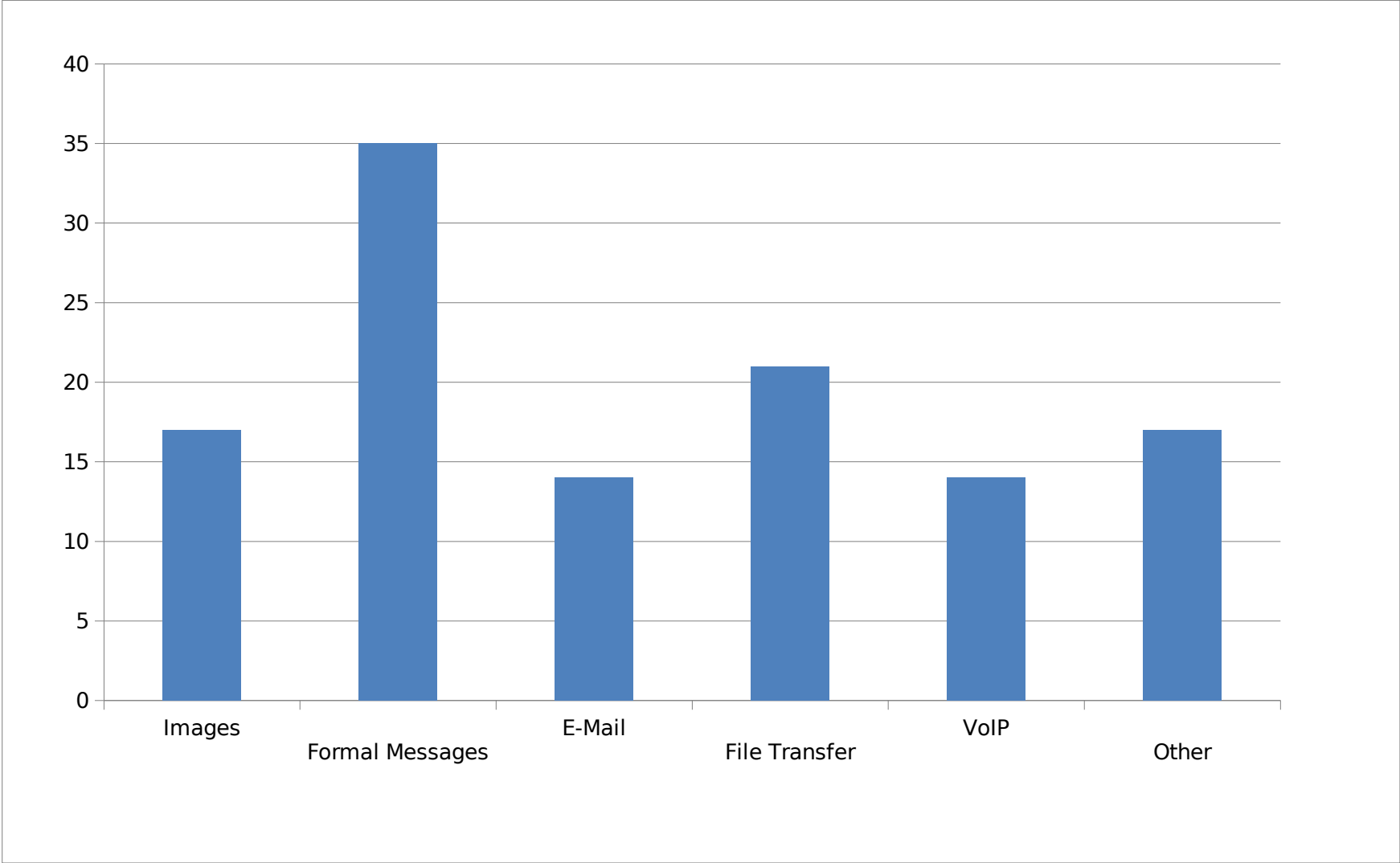
## **Tower of Babel...**

## **Even more interfaces !**

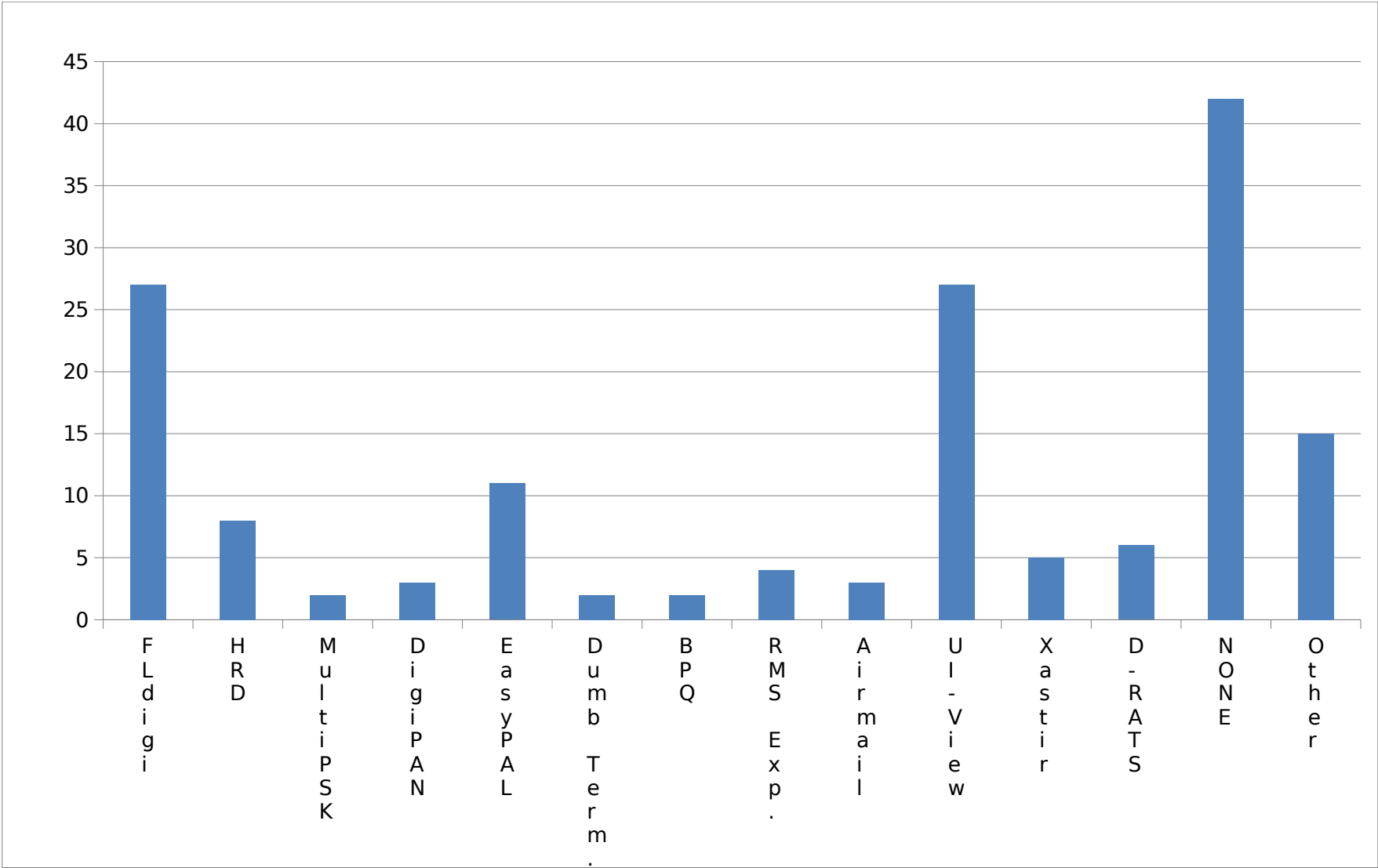
# Q19: What percentage of your group are equipped for Amateur Data Modes?



# Q21: What do you use your data capability for?



# Q18: What data software do you use?







## **We need to thin the herd**

**Fldigi is Operating System agnostic but it is capable of transmitting many ( many ! ) digi modes. It doesn't cover AX25 properly though...**

**We also need to consider what works for encryption if needed.**

**Also what have we committed before to Central Government ?**



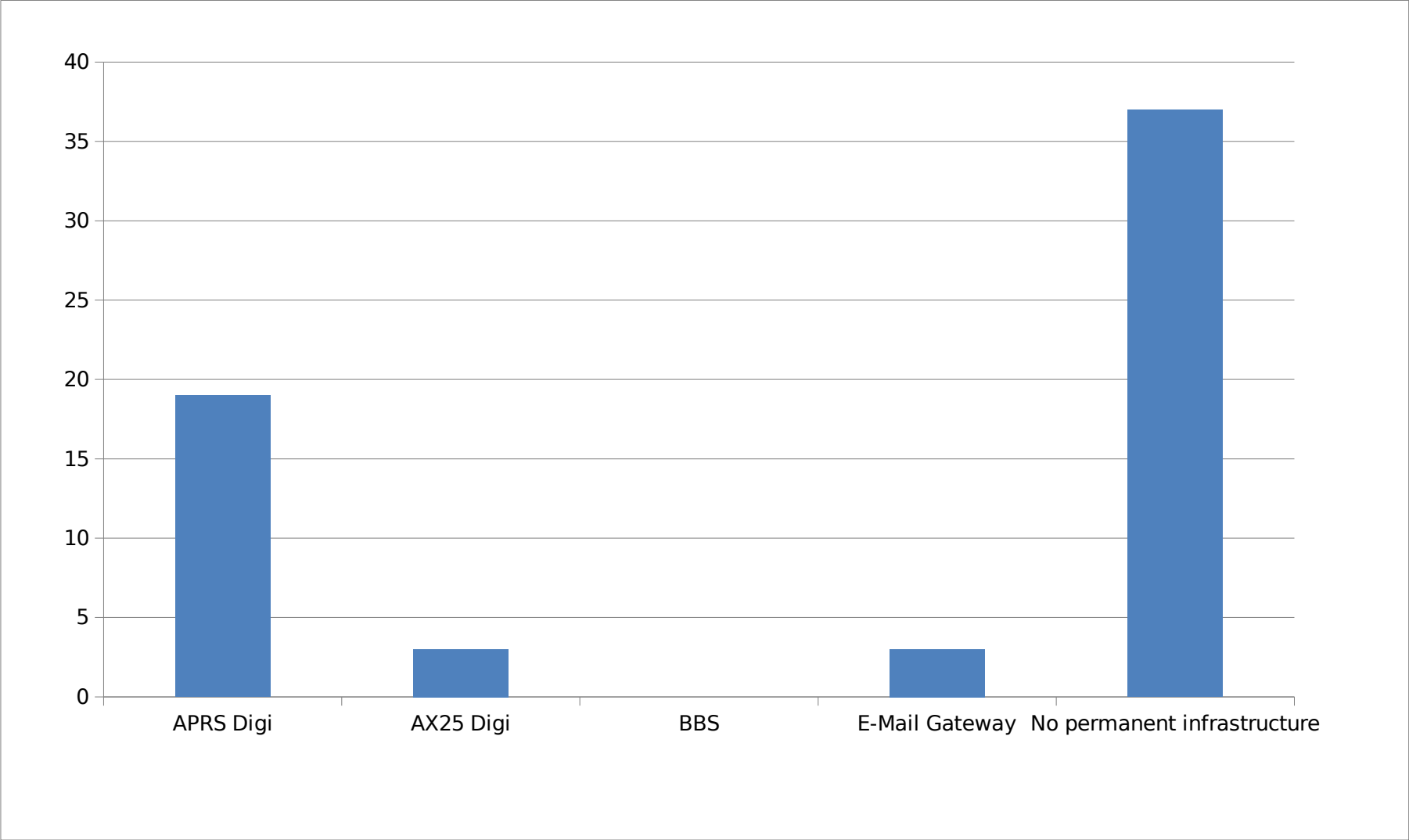
# Requirements

**Requirement – Able to mobilise VHF/UHF Data Network.**

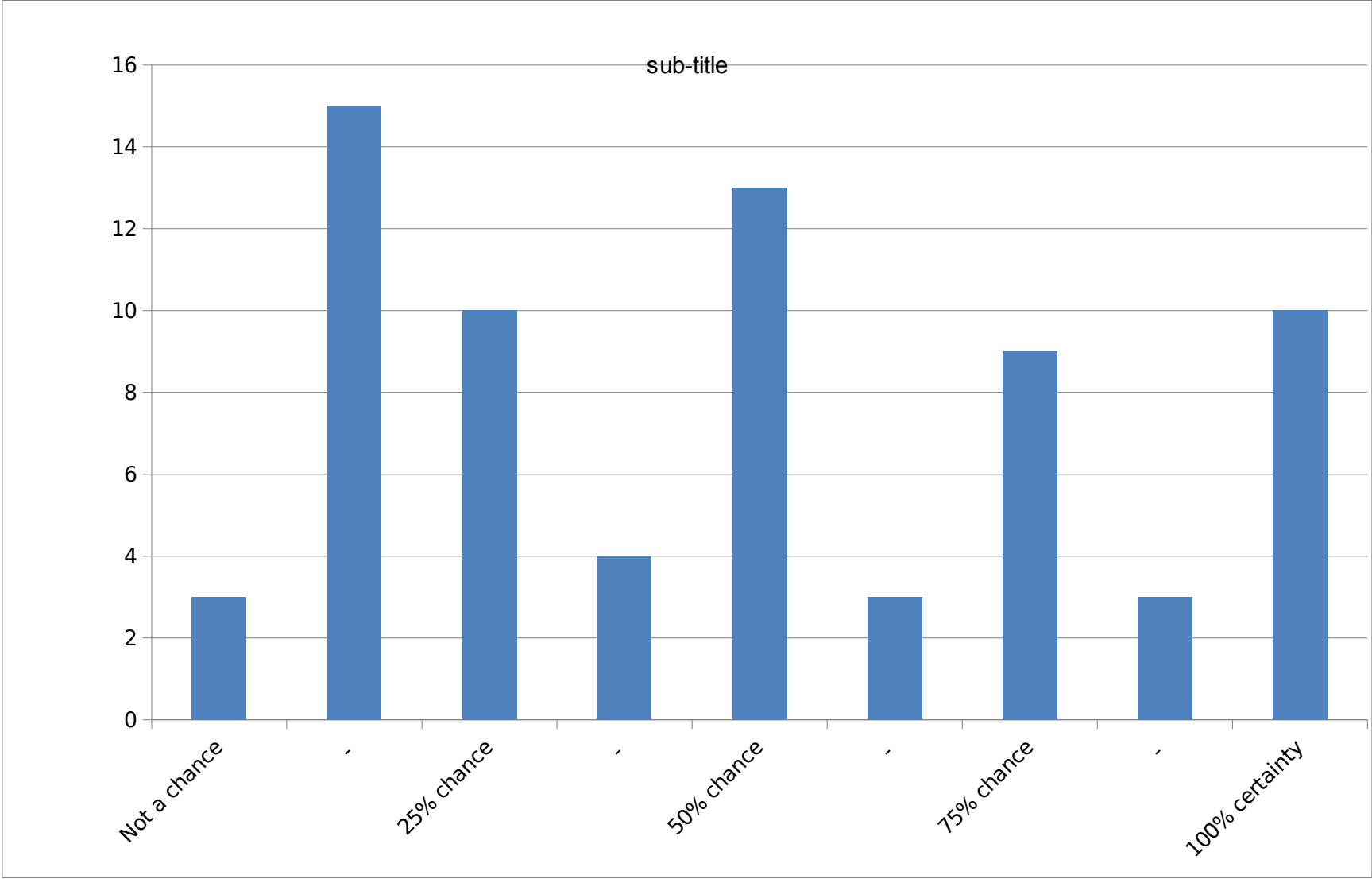
**Threshold – Able to support single point to point network. This could be done with fldigi/soundcards and mobile phone clients.**

**Objective – Able to support multipoint wide area data network ( 1200/9600 Baud ). This means we have to develop some infrastructure and keep it working !**

# Q22: Does your group operate permanent infrastructure to support data operations if so what?



Q20: If you are not using data modes now, do you anticipate using them in 5 years time?





# Requirements

**Requirement – Encryption of Written messages when requested by a Senior User Service Officer**

**Threshold – 512bit encryption using GnuPG**

**Objective – 2048bit encryption using GnuPG**

**Limitations??? We have to be able to send the encrypted data through the data transmission medium. Some do not support upper/lower case characters, punctuation etc.**



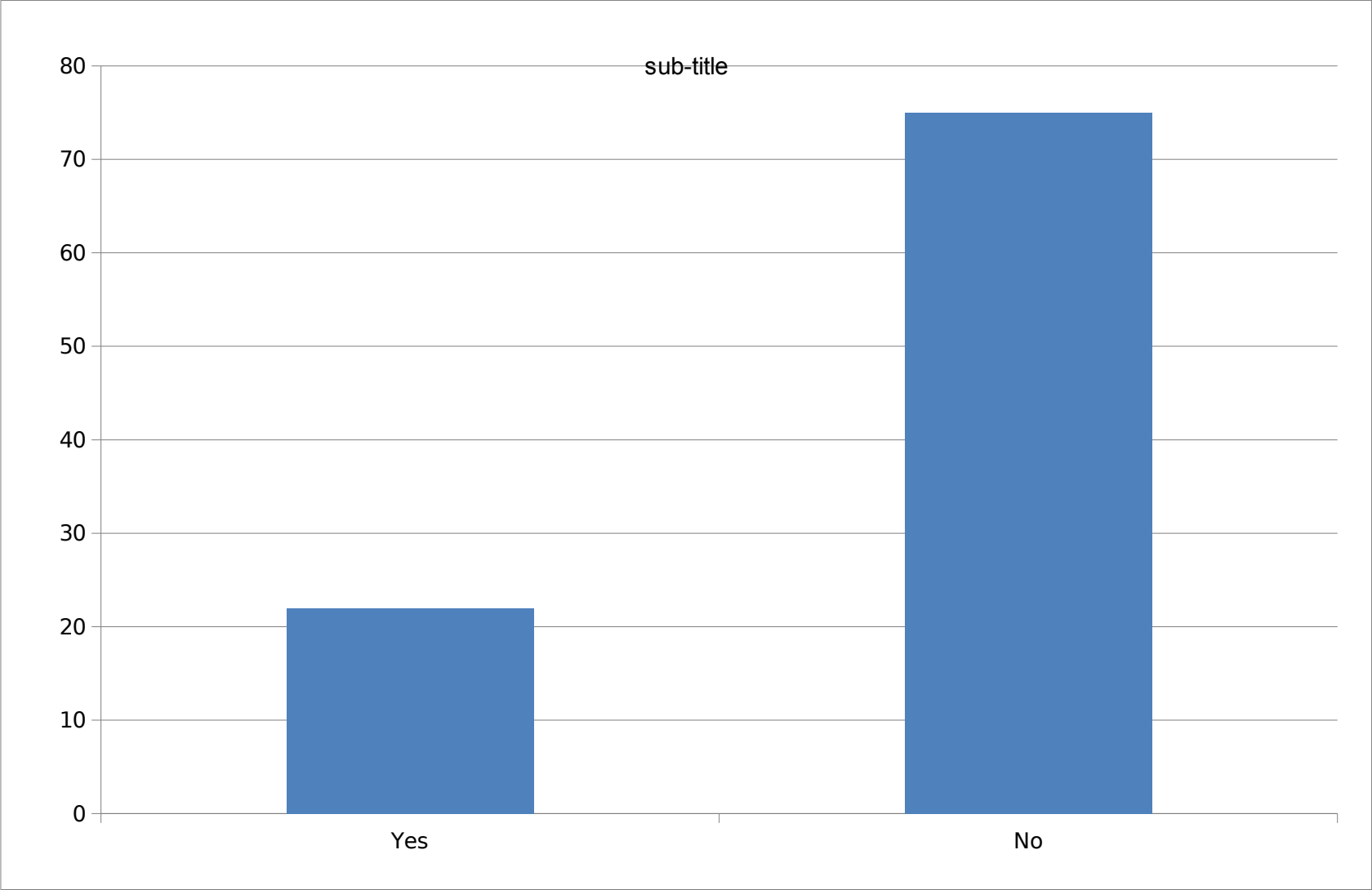
# Requirements

**Requirement – Able to provide WiFi links capable of supporting VoIP, Email etc..**

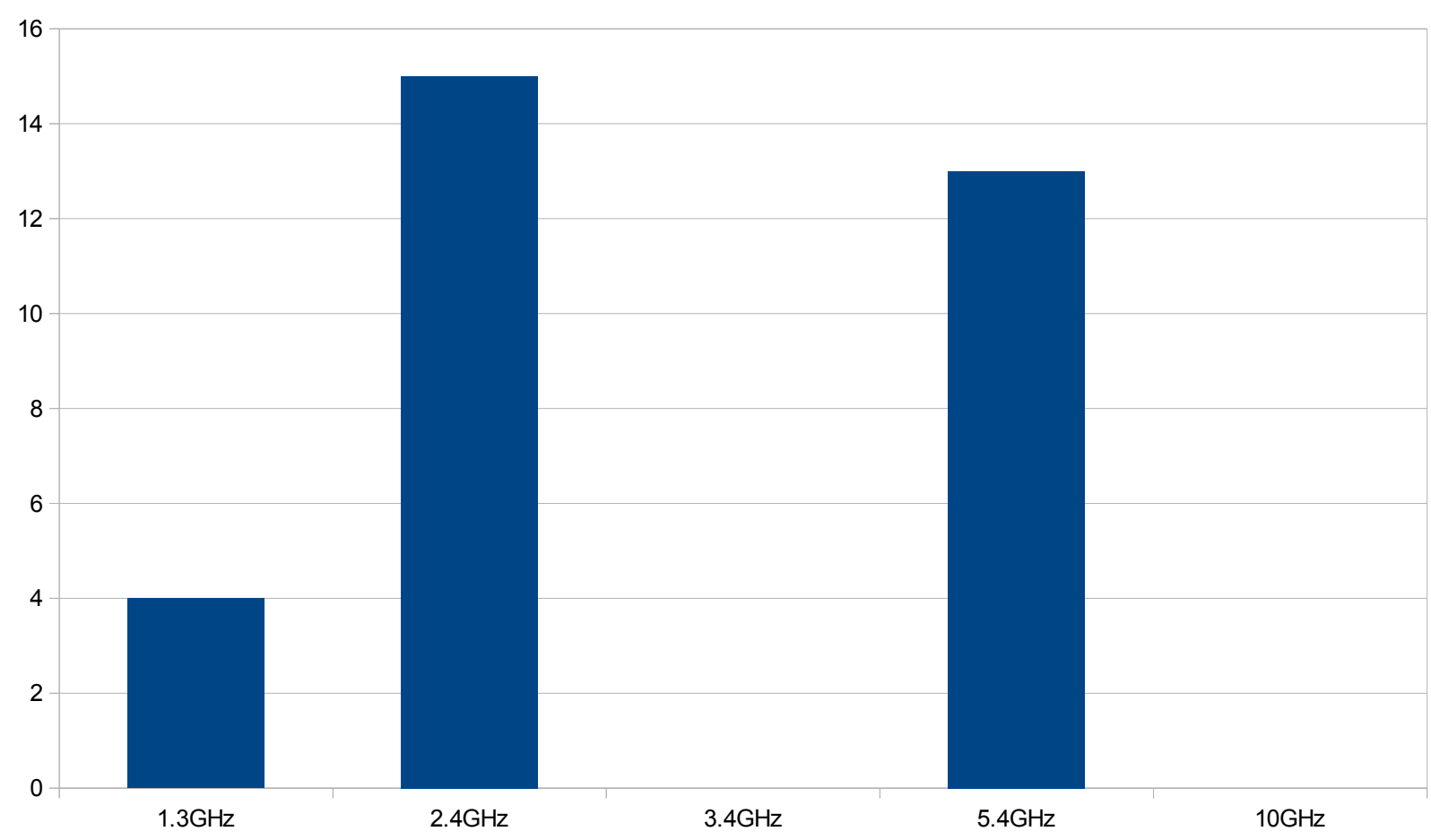
**Threshold – Able to support single point to point link between User Service Controls.**

**Objective – Able to support wide area Wi-Fi network. FEEDNET would be the exemplar of this objective being met.**

# Q23: Does your group use High Speed Data ( e.g. WiFi )

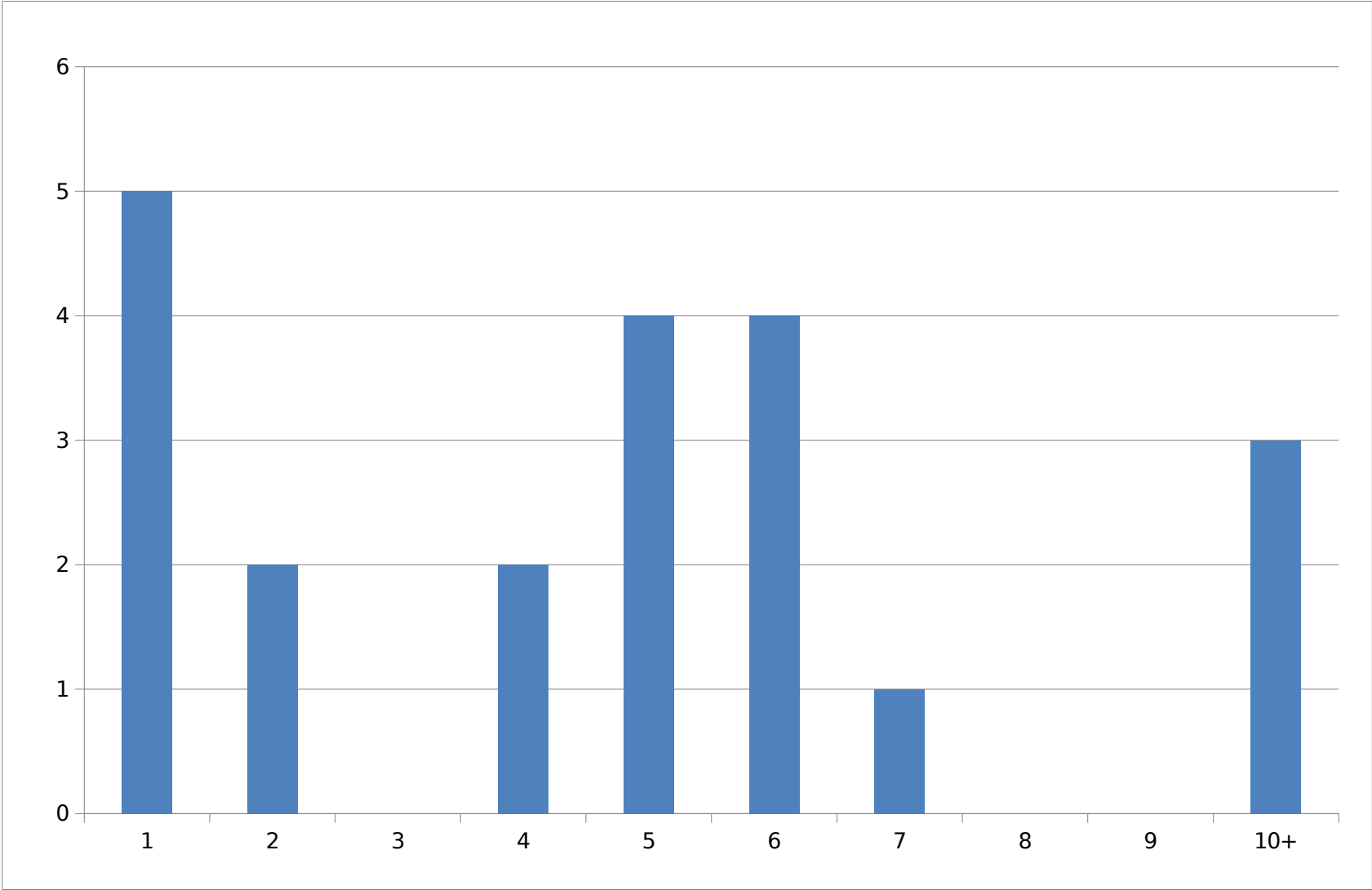


# Q24: What bands do you use to transmit High Speed Data?

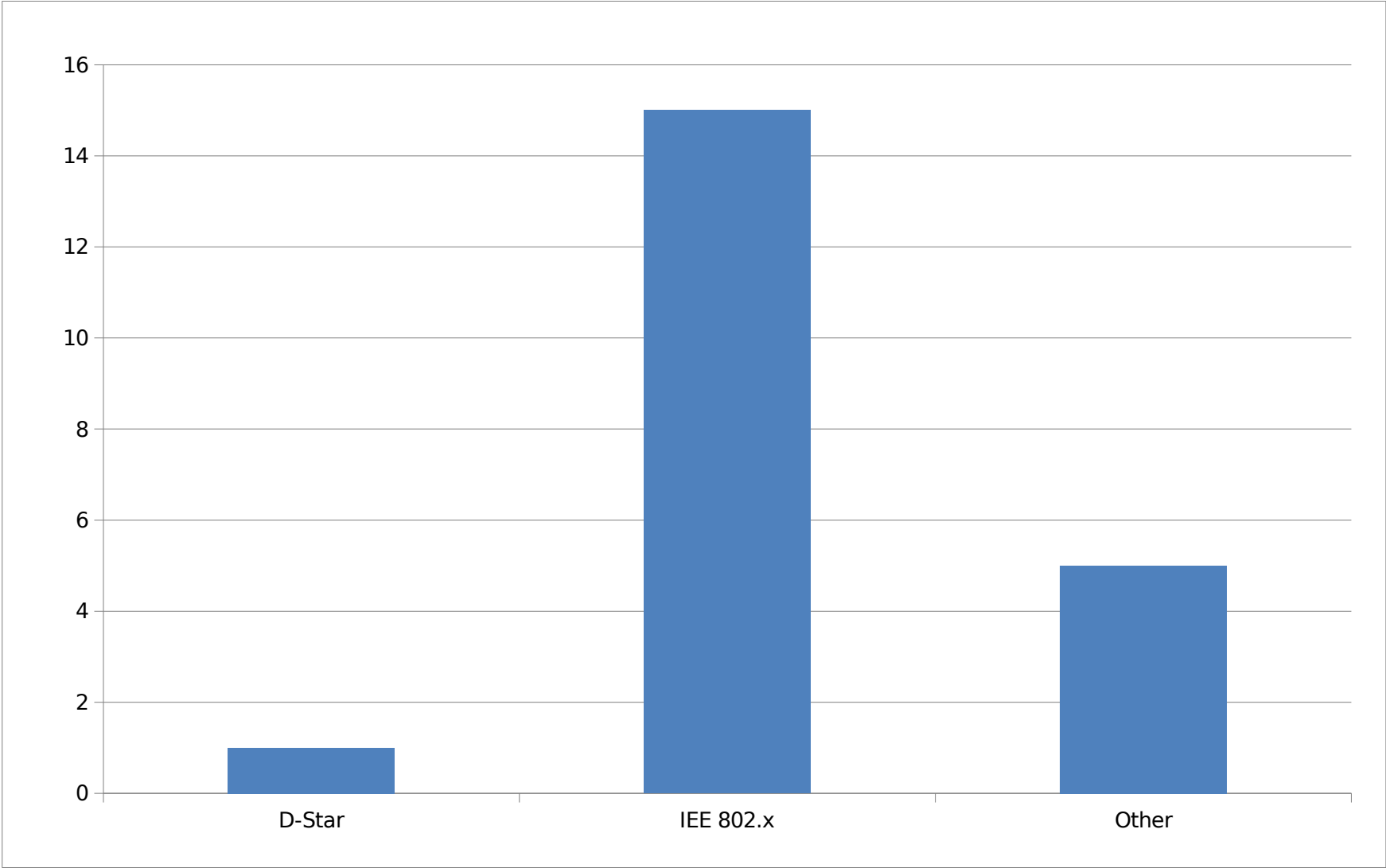




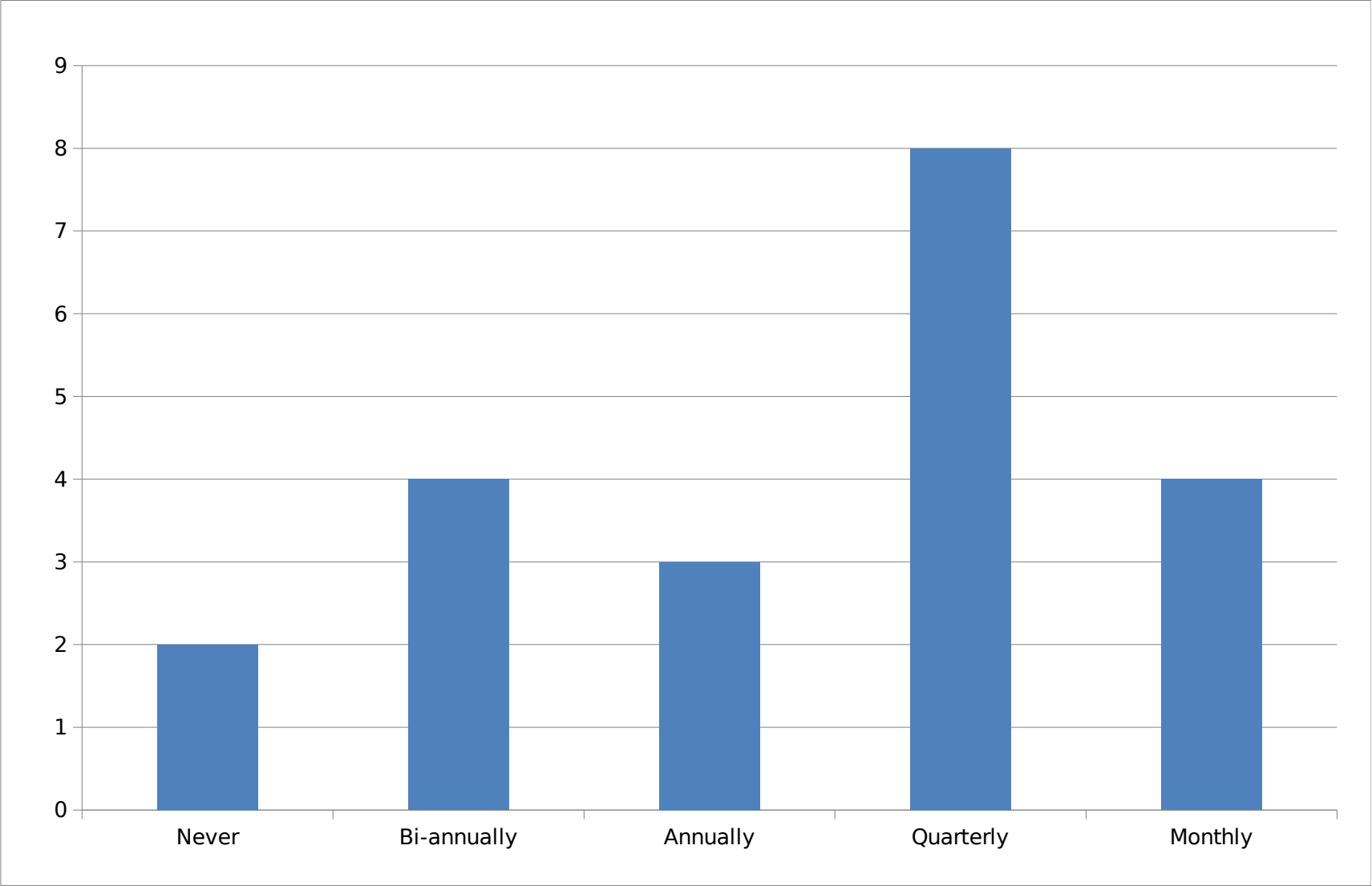
**Q25: How many simultaneous point to point links can your high speed wifi support ( i.e. how much equipment have you got )?**



# Q26: What modes do you use for High Speed data?



# Q27: How frequently does your group use its High Speed Data Capability?





**You can start simply.**



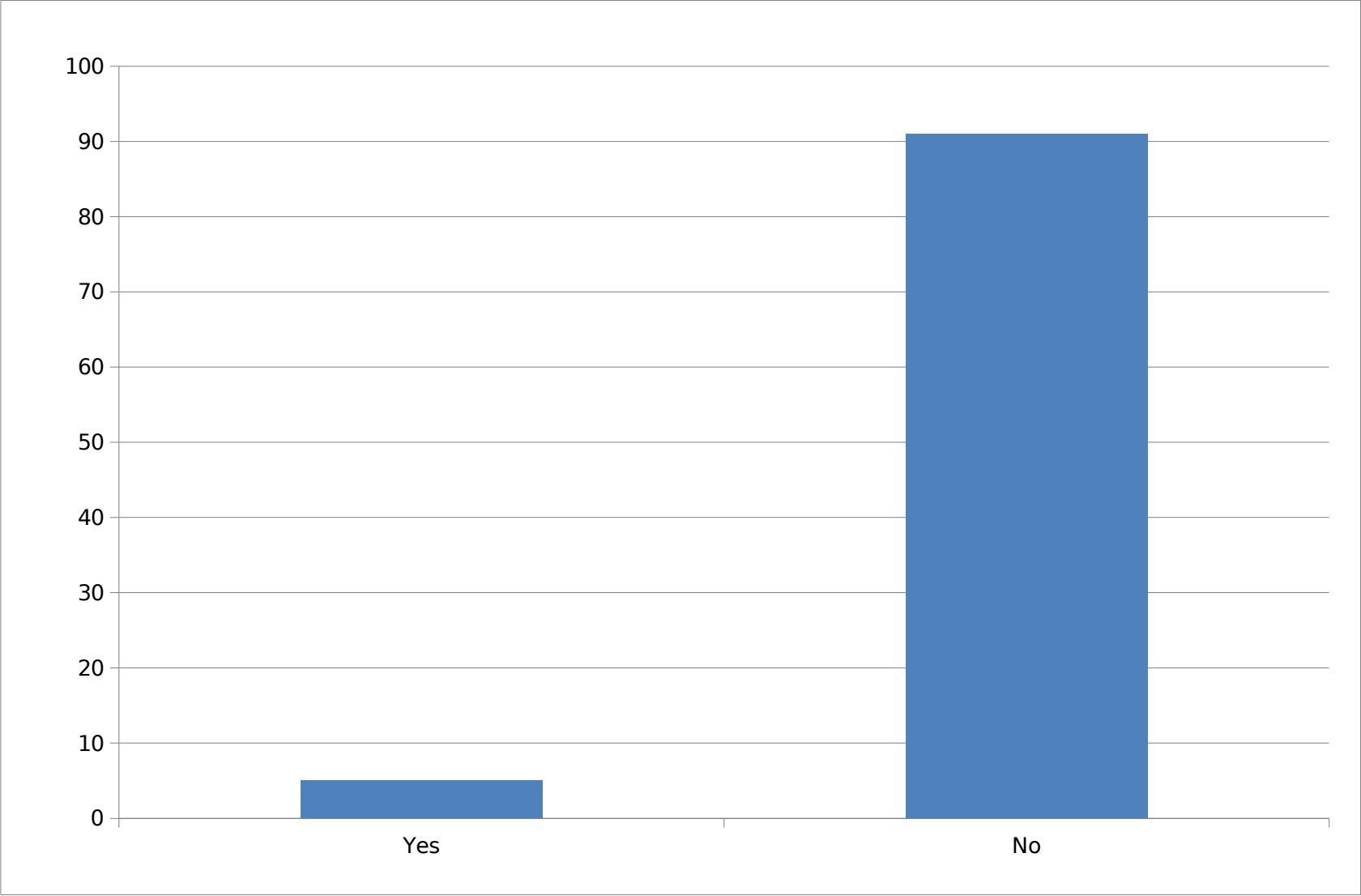




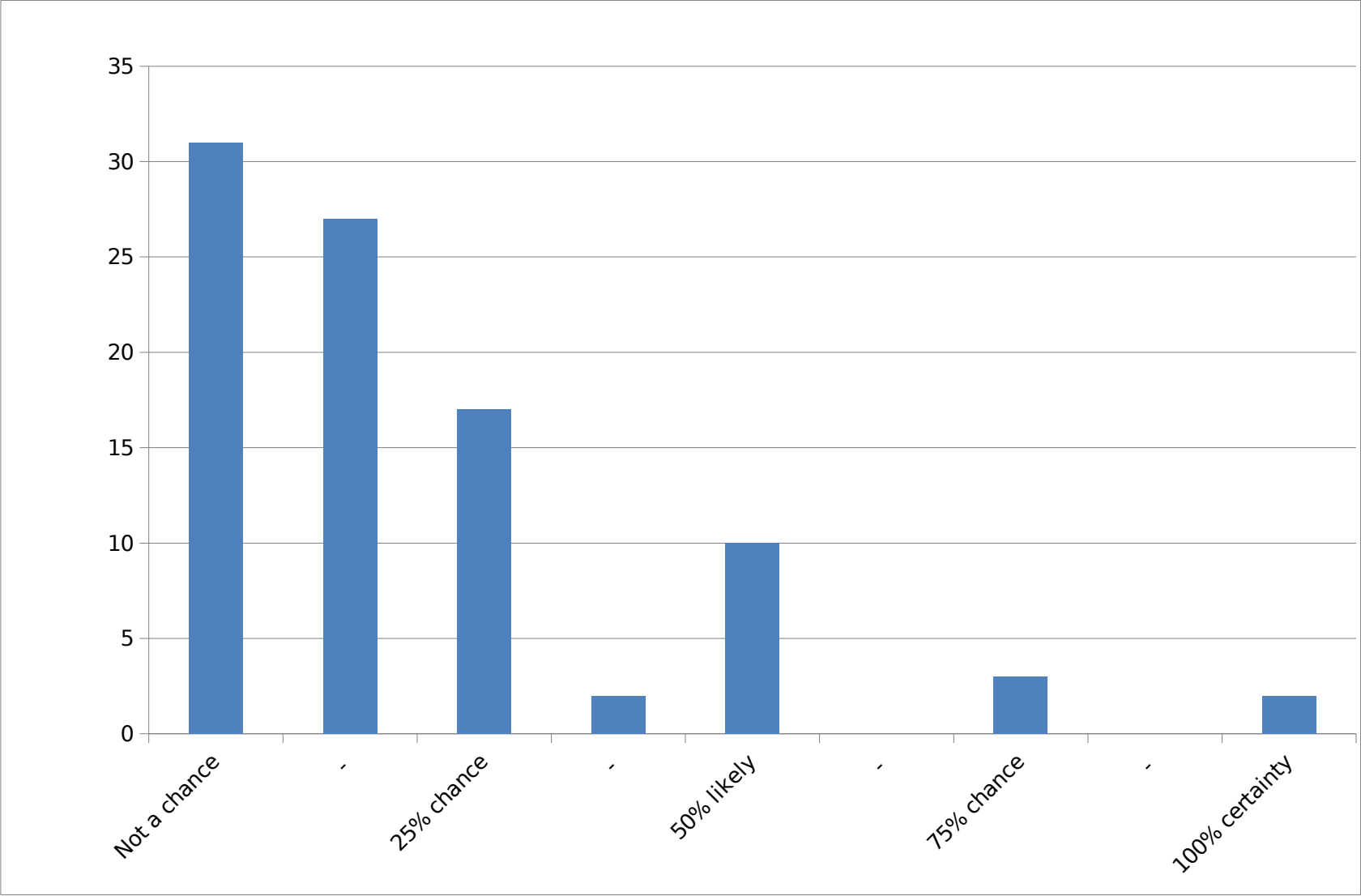
# What about Commercial data?



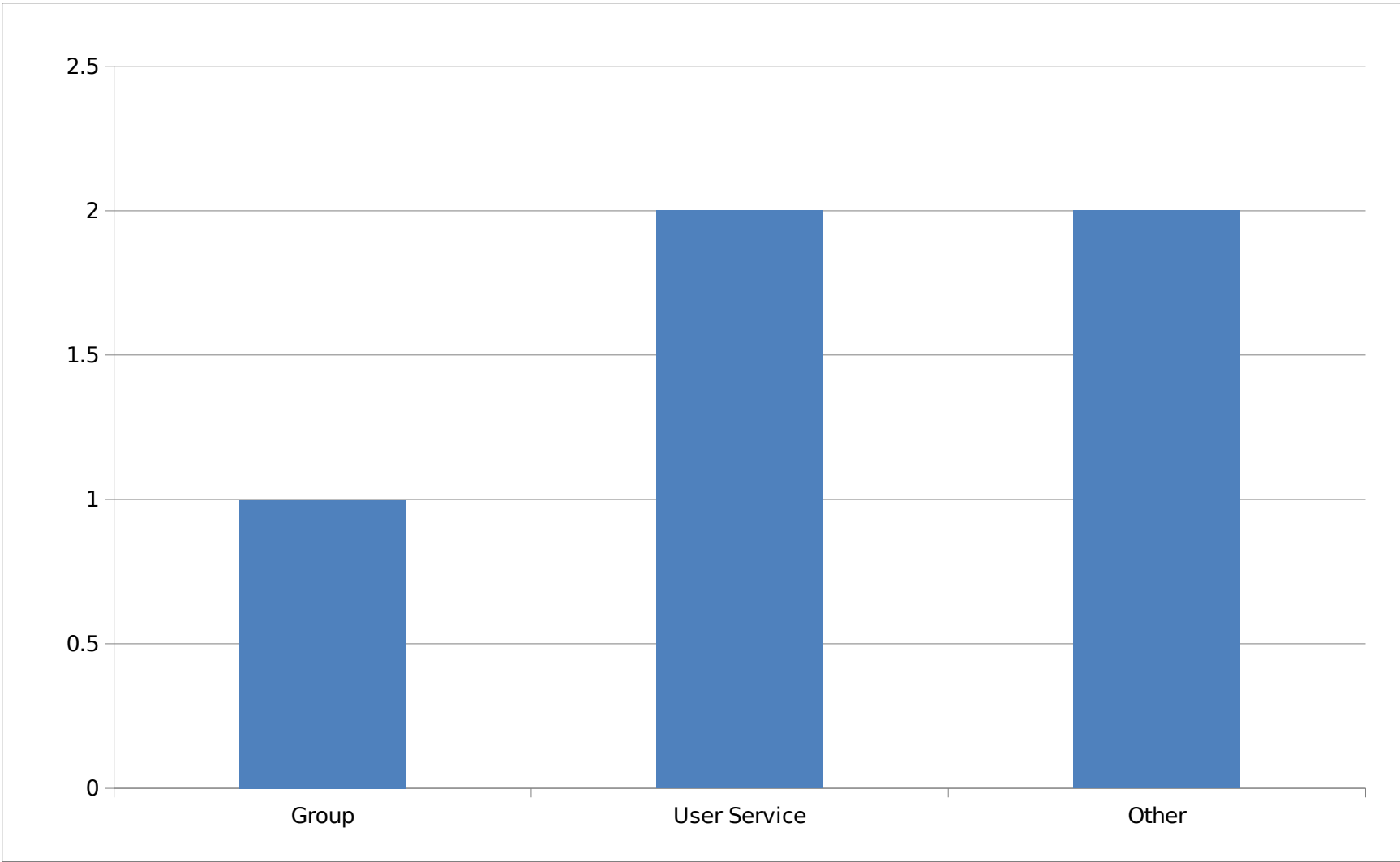
**Q28: Do you use a commercial high speed data service ( e.g. Inmarsat BGAN )**



**Q29: How likely are you to use a commercial high speed data service in the next 5 years?**



**Q30: If you use a commercial high speed data service who funds it?**







## What next ?

**Some discussion here !**

**Development of the Requirements Specification to go down to the Zones.**

**Report to be posted to the website.**

**An acceptance that it is 'all right' to be a 2m/voice group  
If that is what your local requirements are.... as long as  
you actually know and train for your local requirements.**



# Discussion