

# IoT DEVELOPER SURVEY RESULTS

April 2017



# SURVEY INTRODUCTION

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- The **Eclipse IoT Working Group, IEEE IoT, AGILE IoT and IoT Council** co-sponsored an online survey to better understand how developers are building IoT solutions.
- The survey was open from February 7 until March 17, 2017. A total of **713 individuals participated** in the survey. Each partner promoted the survey to their communities through social media and web sites.



# **KEY FINDINGS**

# KEY FINDINGS - TOP 5 IoT INDUSTRIES

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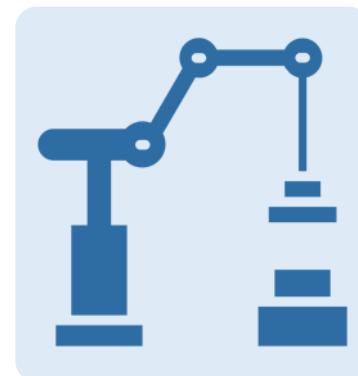
*and trends from previous years*



**HOME  
AUTOMATION**



**IoT  
PLATFORM**



**INDUSTRIAL  
AUTOMATION**



**ENERGY  
MANAGEMENT**



**CONNECTED  
CITIES**

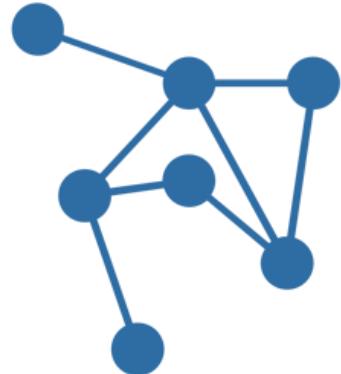
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# KEY IoT CONCERNS

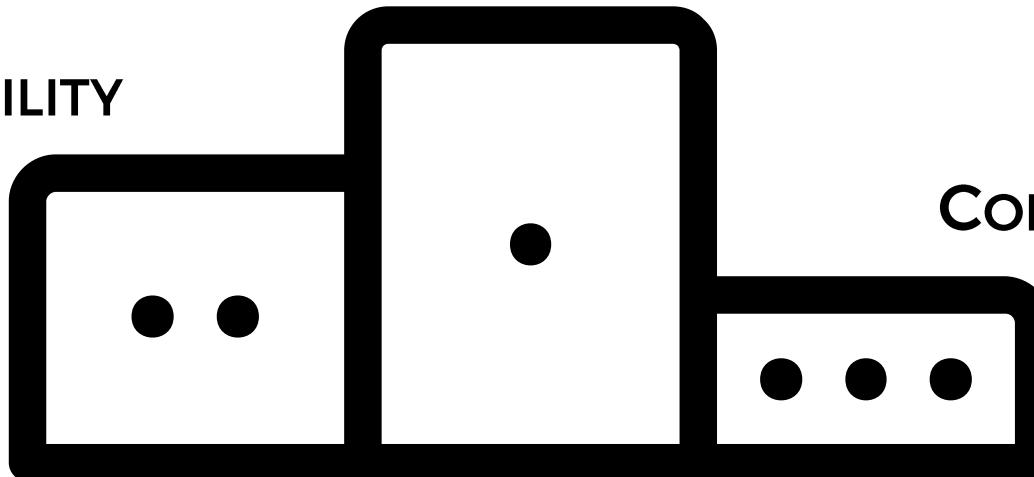
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INTEROPERABILITY



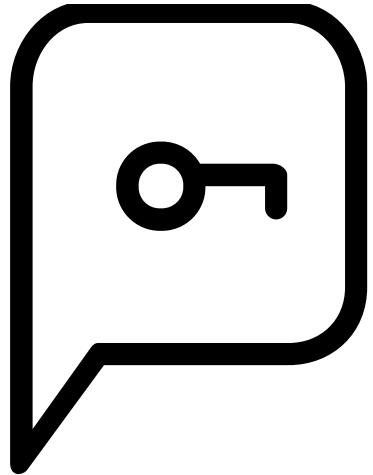
SECURITY



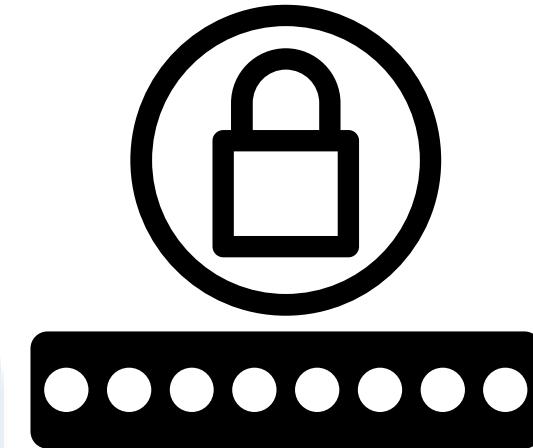
CONNECTIVITY

# KEY IoT SECURITY TECHNOLOGY

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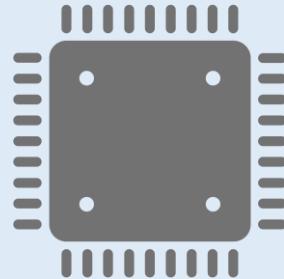
**COMMUNICATION SECURITY  
(TLS, DTLS, ...)**



**DATA ENCRYPTION**

# TOP IoT PROGRAMMING LANGUAGES

## CONSTRAINED DEVICES



C

C++  python™  


## GATEWAYS



c/c++  python™

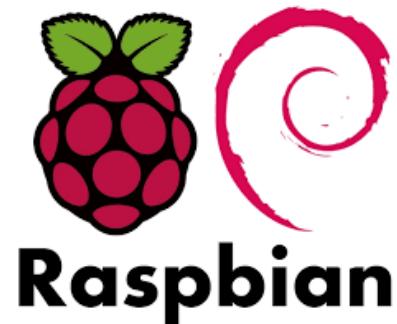
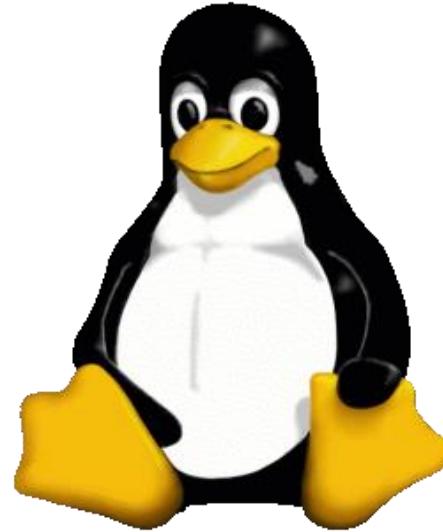
## IoT CLOUD



JS   
 python™

# TOP IoT OPERATING SYSTEMS & DISTROS

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ubuntu®

# CLOUD PLATFORMS OF CHOICE FOR IoT

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Microsoft Azure



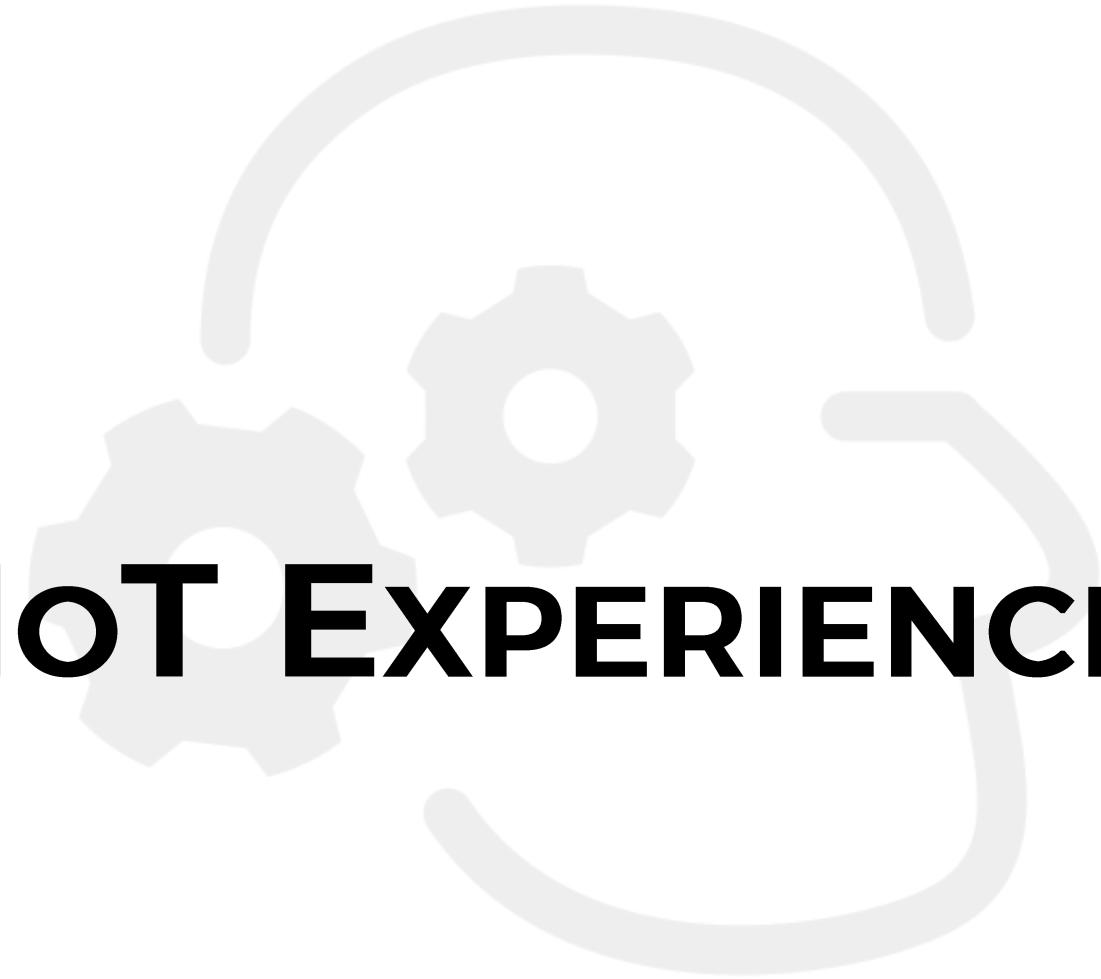
Google Cloud Platform

# GROWTH OF NEW CONNECTIVITY TECHNOLOGIES

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**LPWA Technologies**

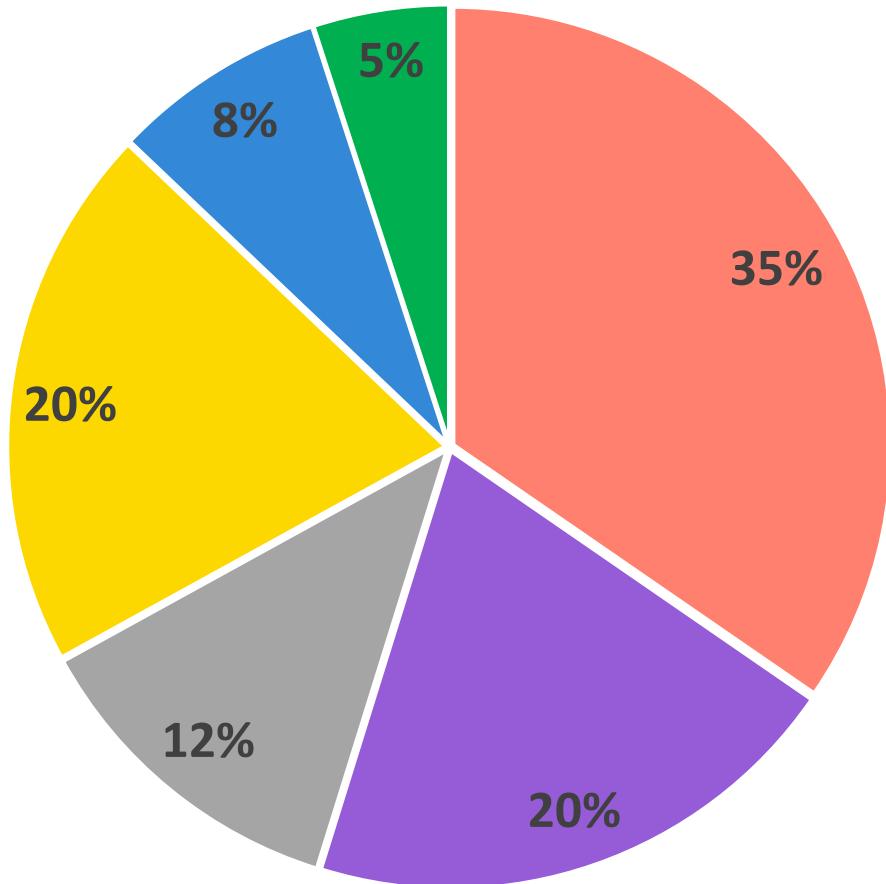


# IoT EXPERIENCE

# IoT EXPERIENCE

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*What is your primary experience with building IoT solutions?*

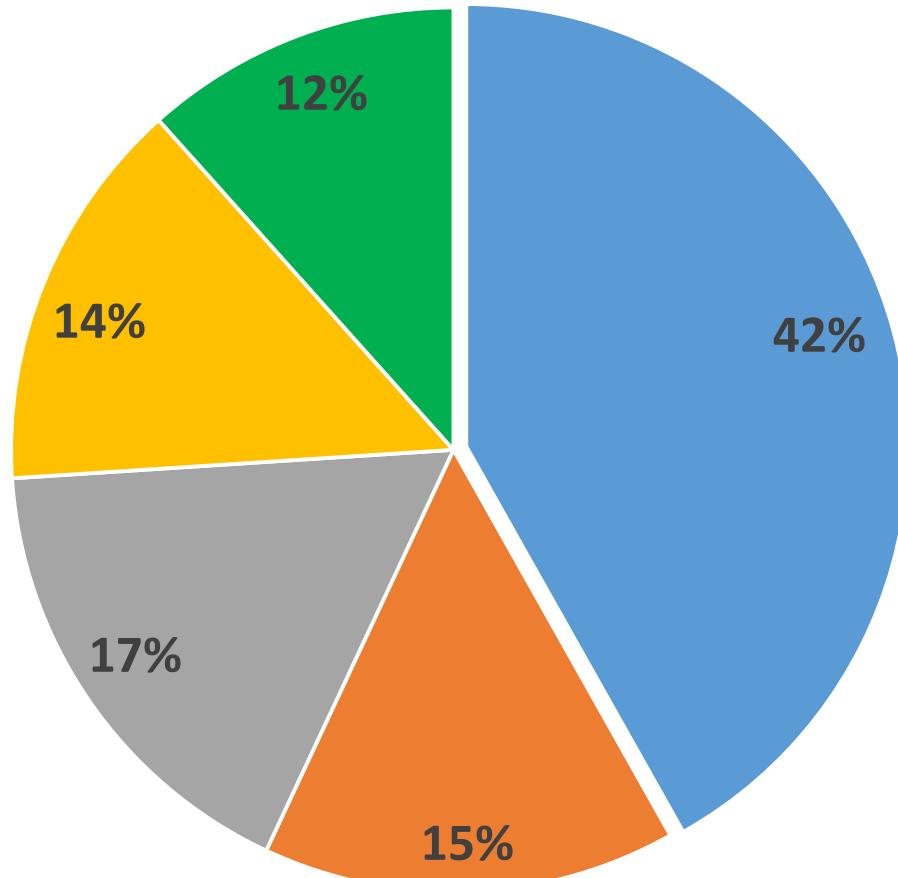


- I develop IoT solutions for my company
- I am researching IoT solutions for my company
- I develop IoT solutions in my spare time only
- I am learning about IoT technology in my spare time
- No experience
- Other

# COMPANY PLANS FOR IoT

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*What is your company's plan for IoT solutions?*

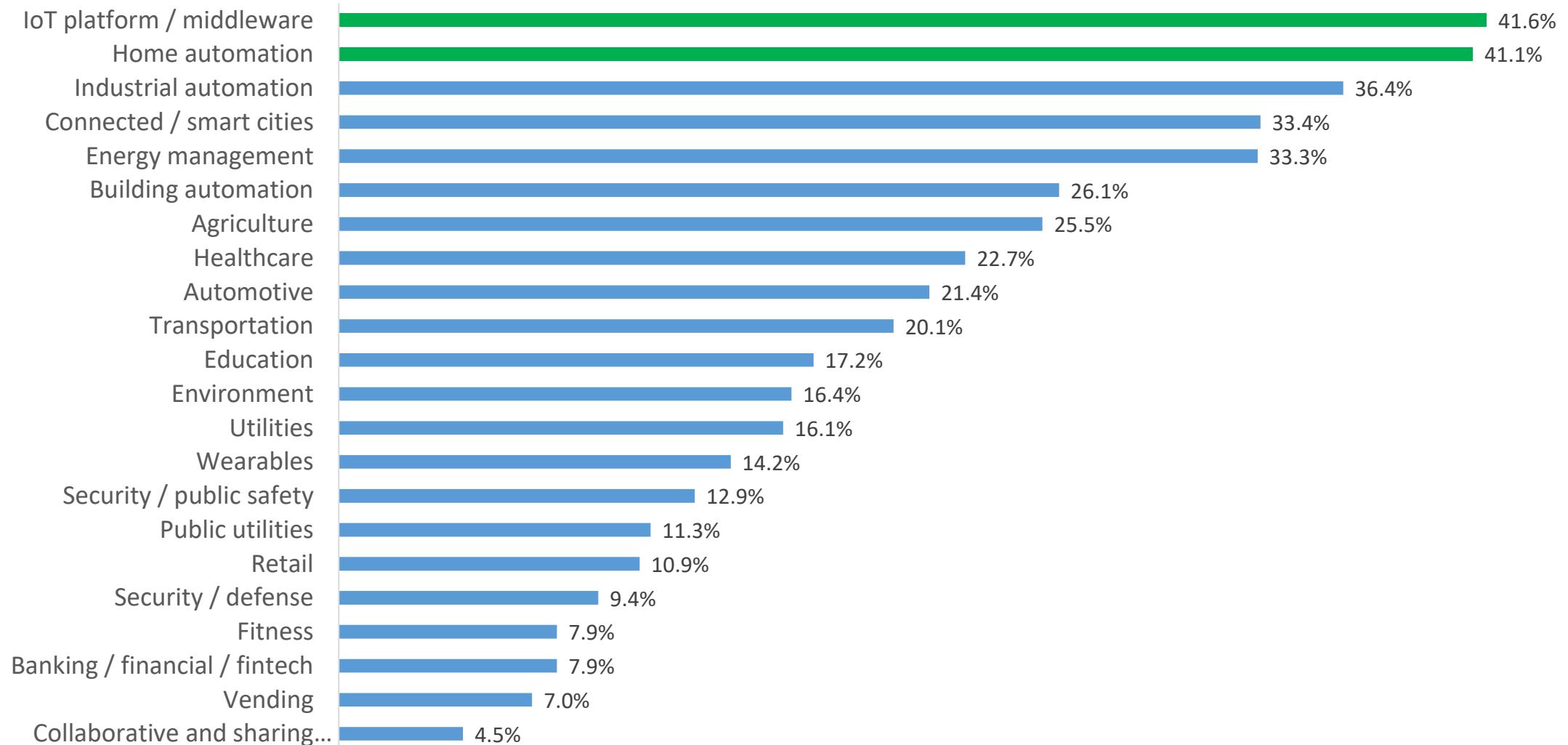


- My company develops and deploys IoT solutions today
- My company plans to develop and deploy IoT solutions in the next 6 months
- My company plans to develop and deploy IoT solutions in the next 7-18 months
- My company has no plans to develop IoT solutions
- Don't know

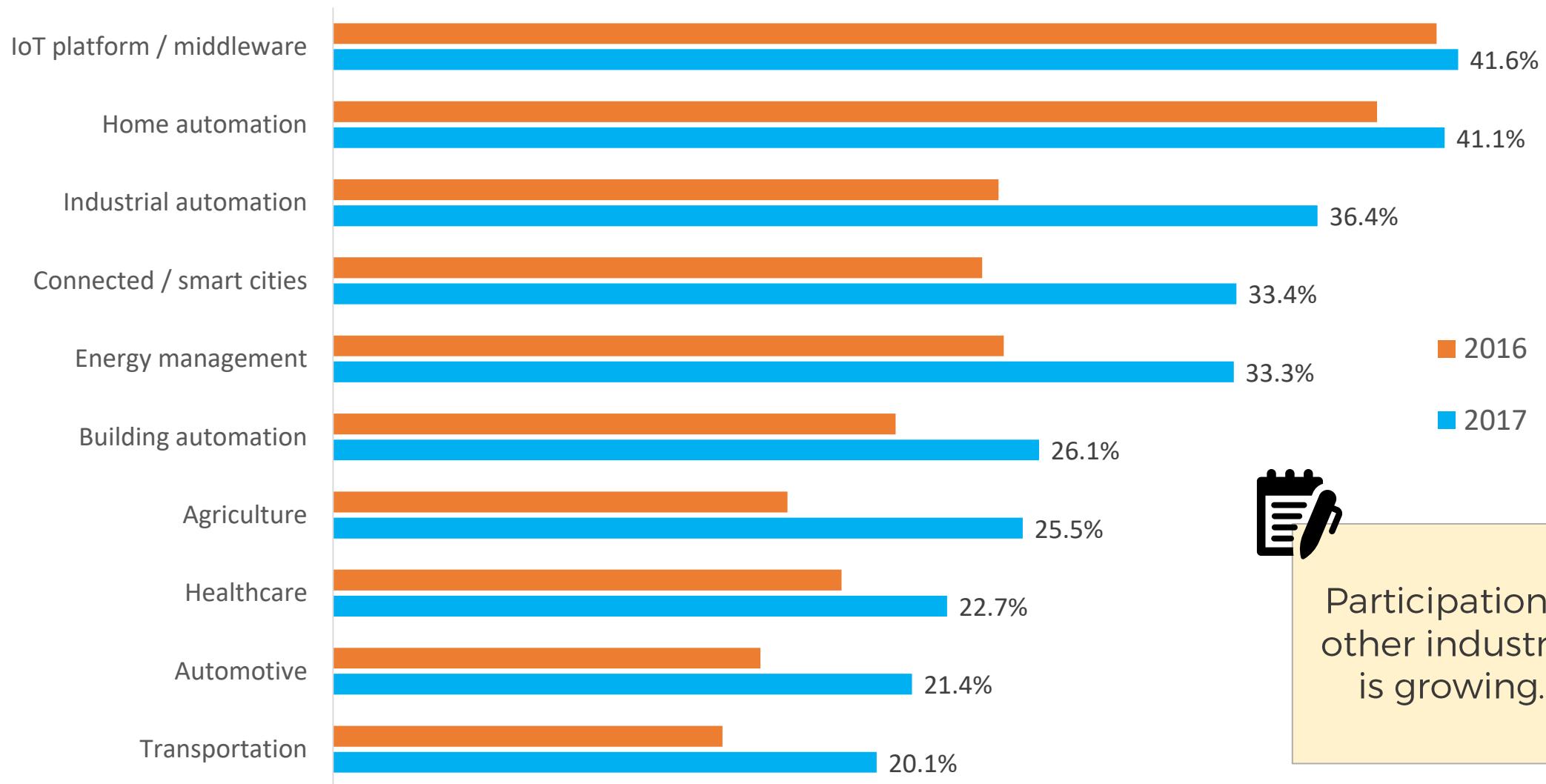
# KEY INDUSTRIES

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*What industry or industries best describe(s) the type of IoT solutions you have built or will build?*



# KEY INDUSTRIES / TRENDS 2016-2017

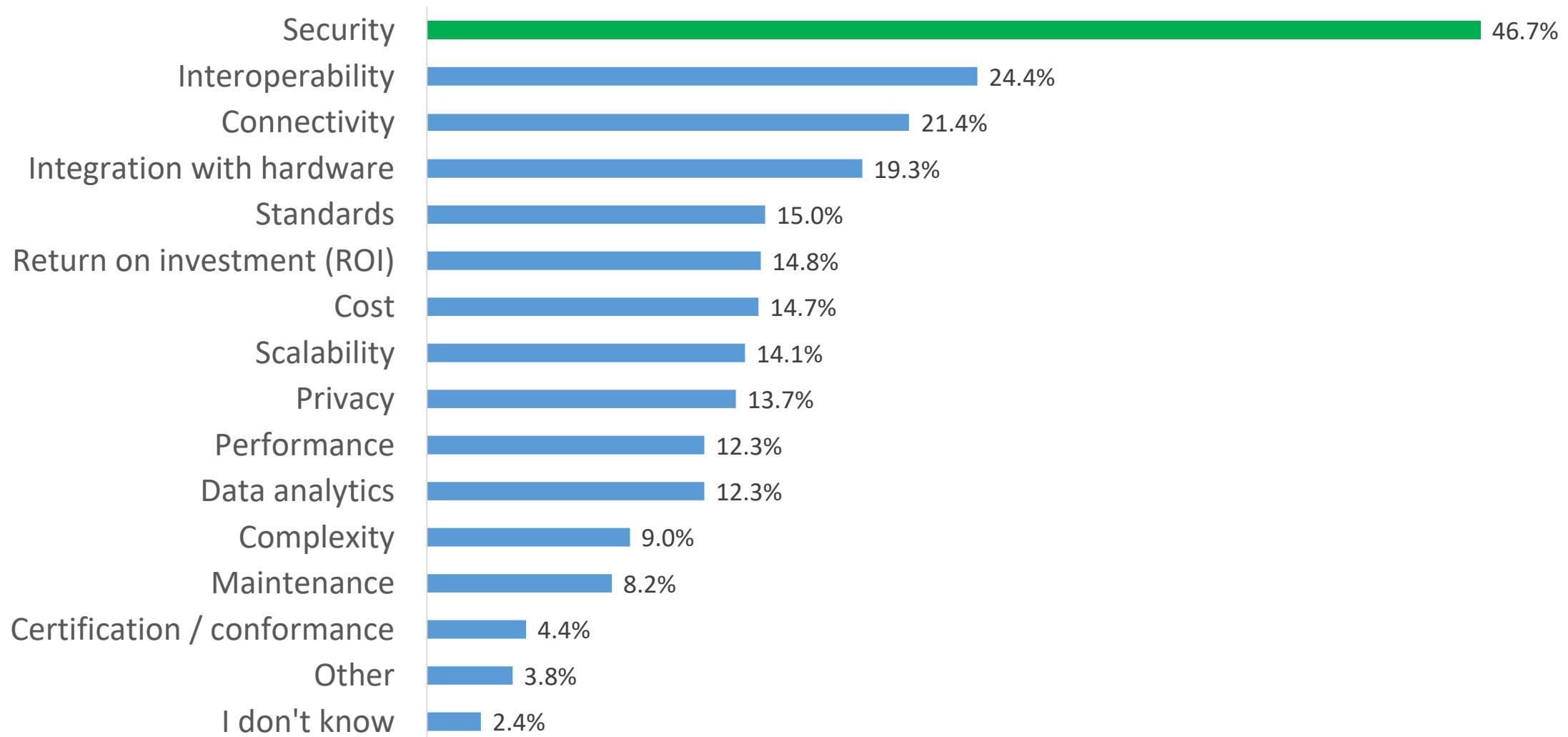


Participation of  
other industries  
is growing...

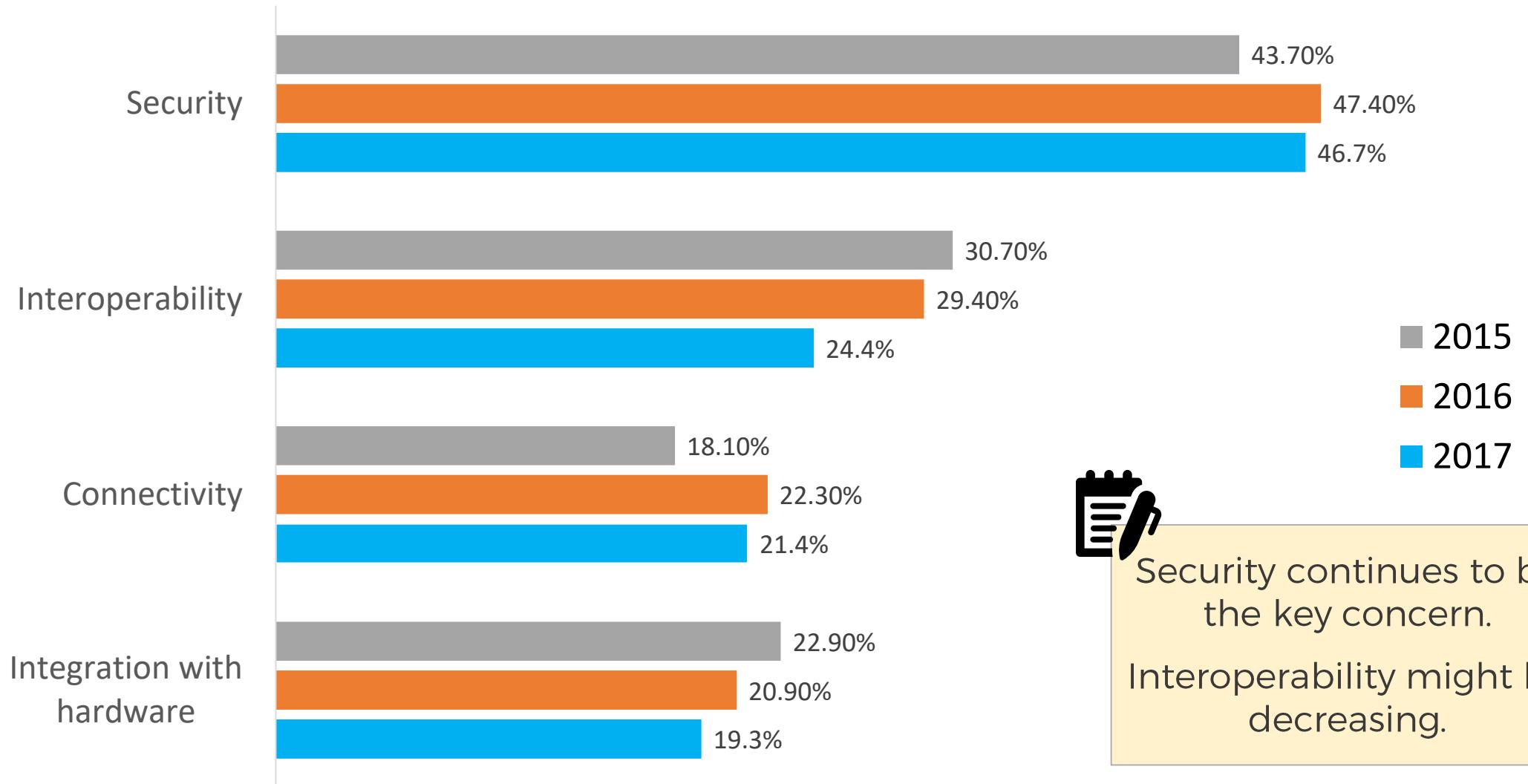
# TOP IoT CONCERNs

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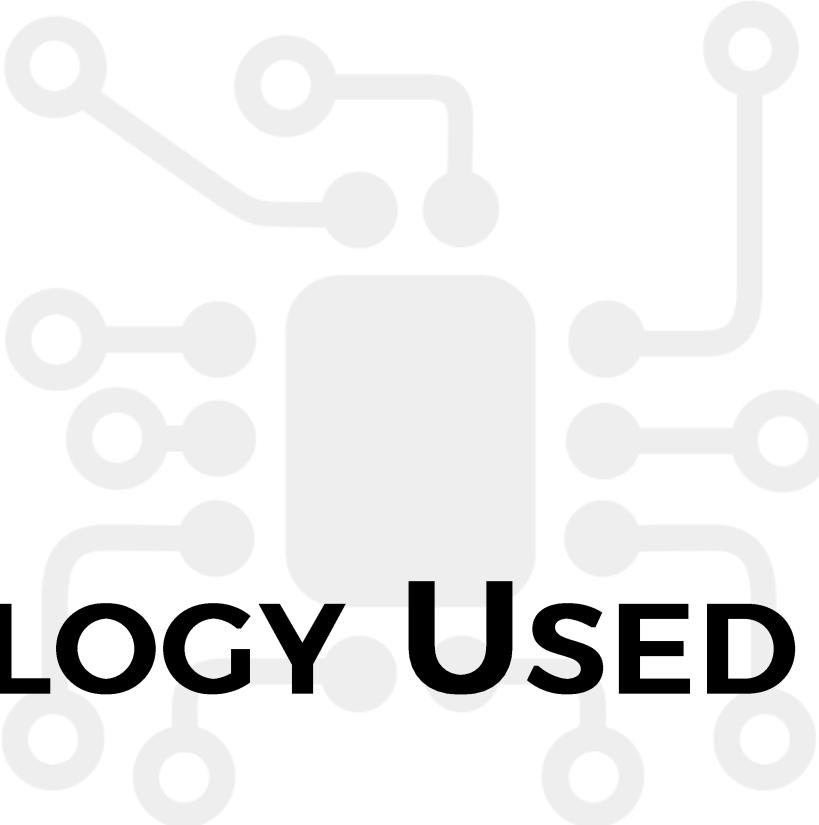
*What are your top 2 concerns for developing IoT solutions?*



# TOP IoT CONCERNS / TRENDS 2015-2017



Security continues to be the key concern.  
Interoperability might be decreasing.

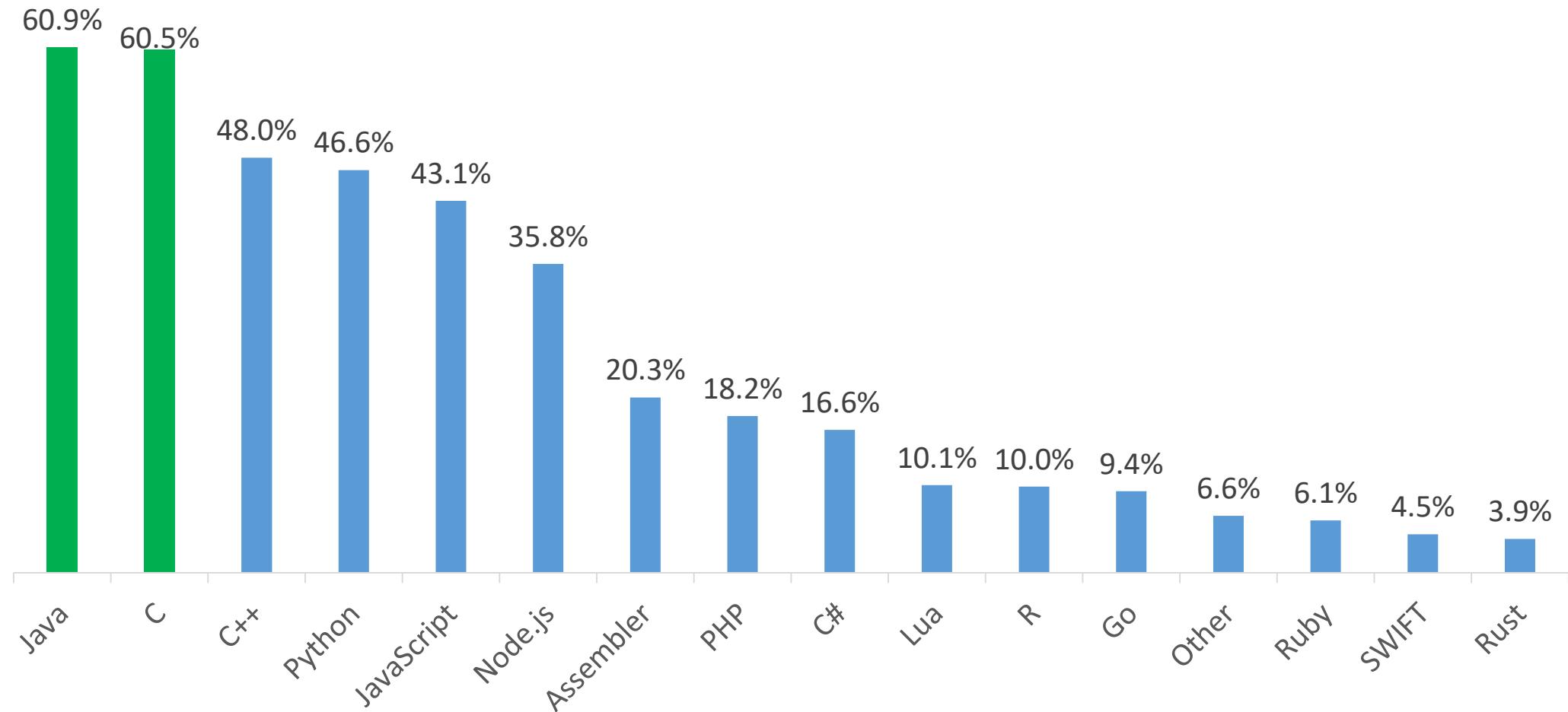


# **TECHNOLOGY USED FOR IoT**

# OVERALL SUMMARY OF LANGUAGE USAGE

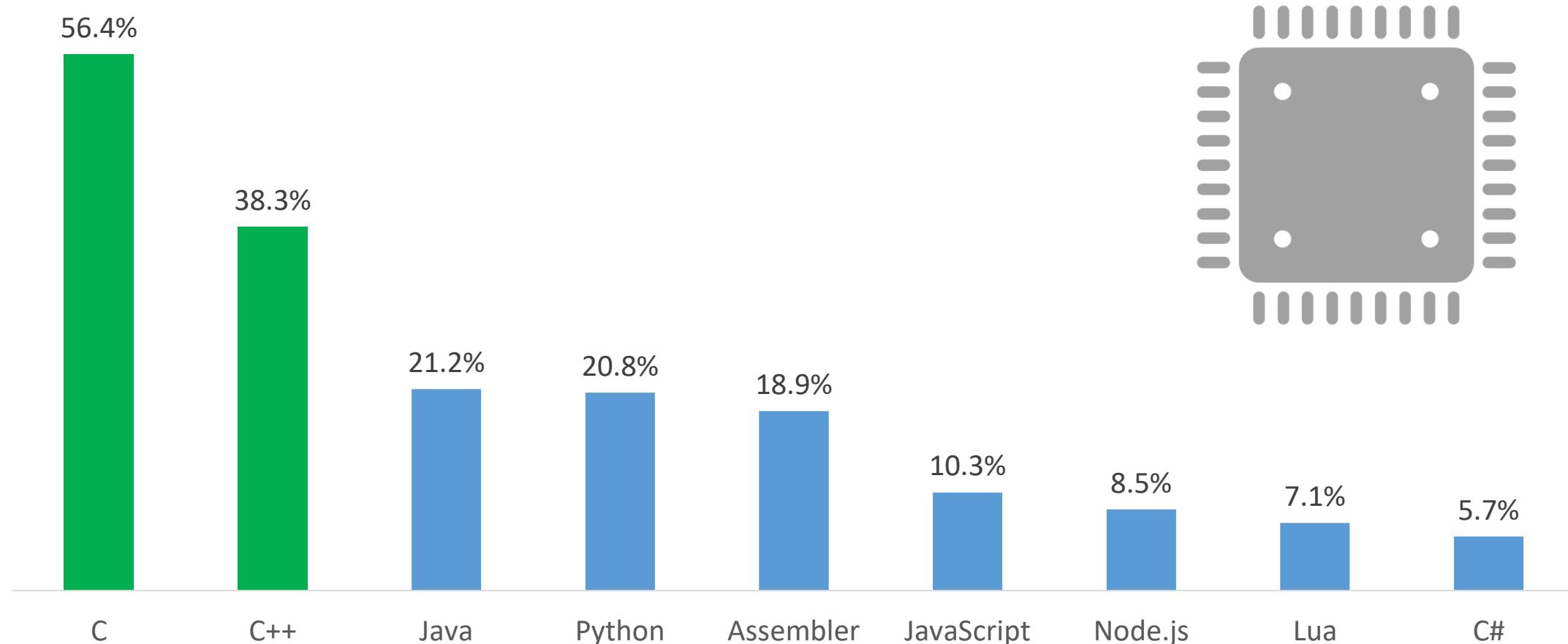
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*Which of the following programming languages, if any, do you use to build IoT solutions?*



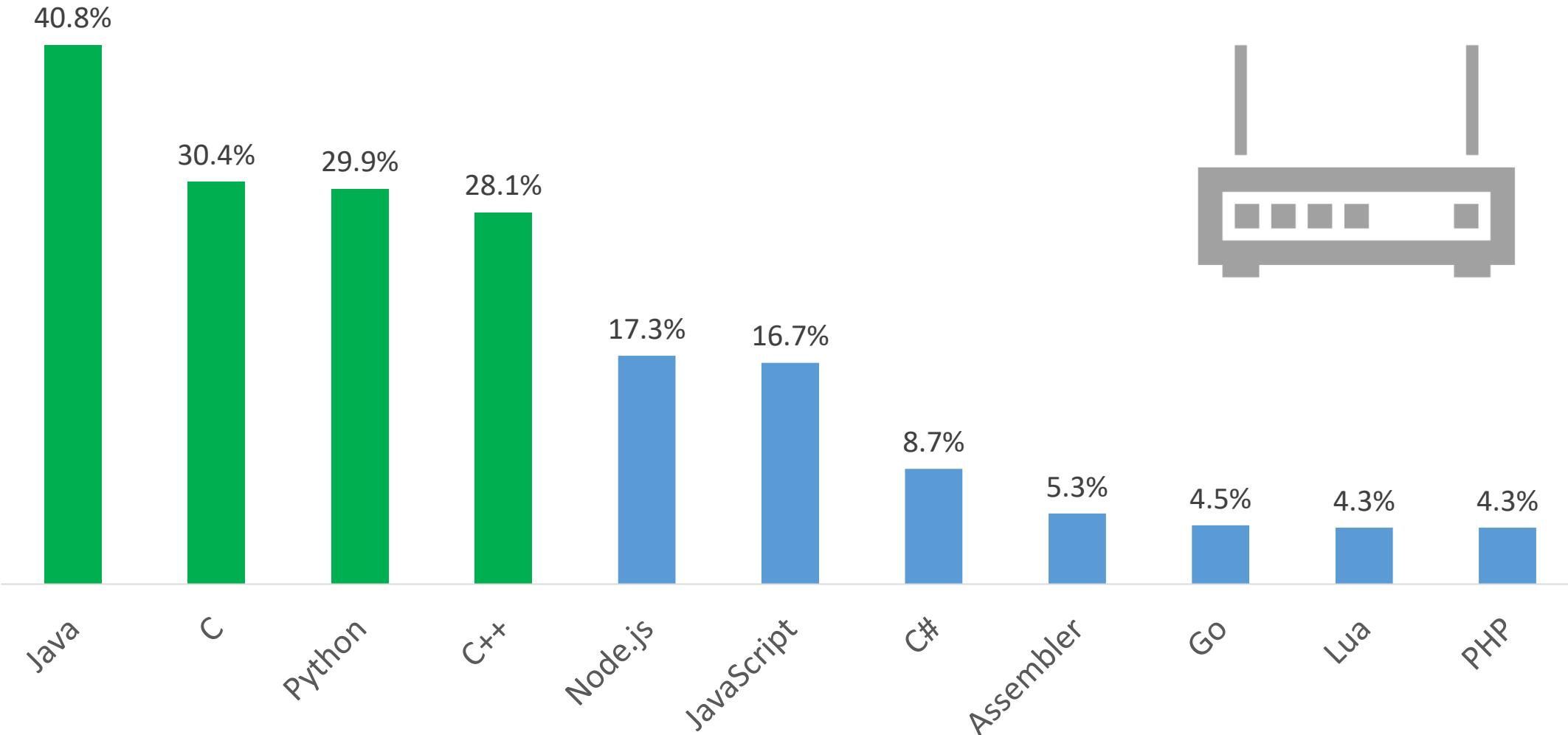
# PROGRAMMING LANGUAGES – CONSTRAINED DEVICES

*Which of the following programming languages, if any, do you use to build IoT solutions? (Constrained Devices)*



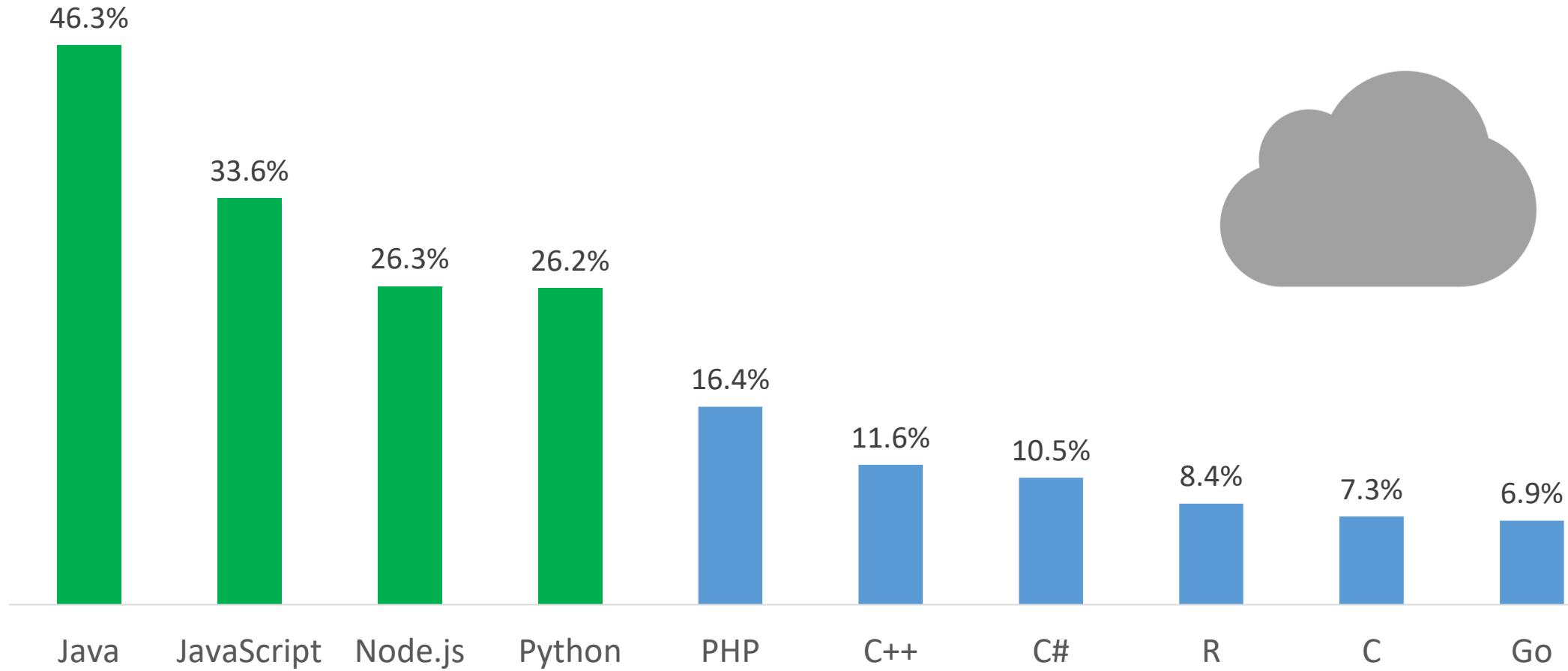
# PROGRAMMING LANGUAGES – IoT GATEWAYS

*Which of the following programming languages, if any, do you use to build IoT solutions? (Gateways)*



# PROGRAMMING LANGUAGES – IoT CLOUD

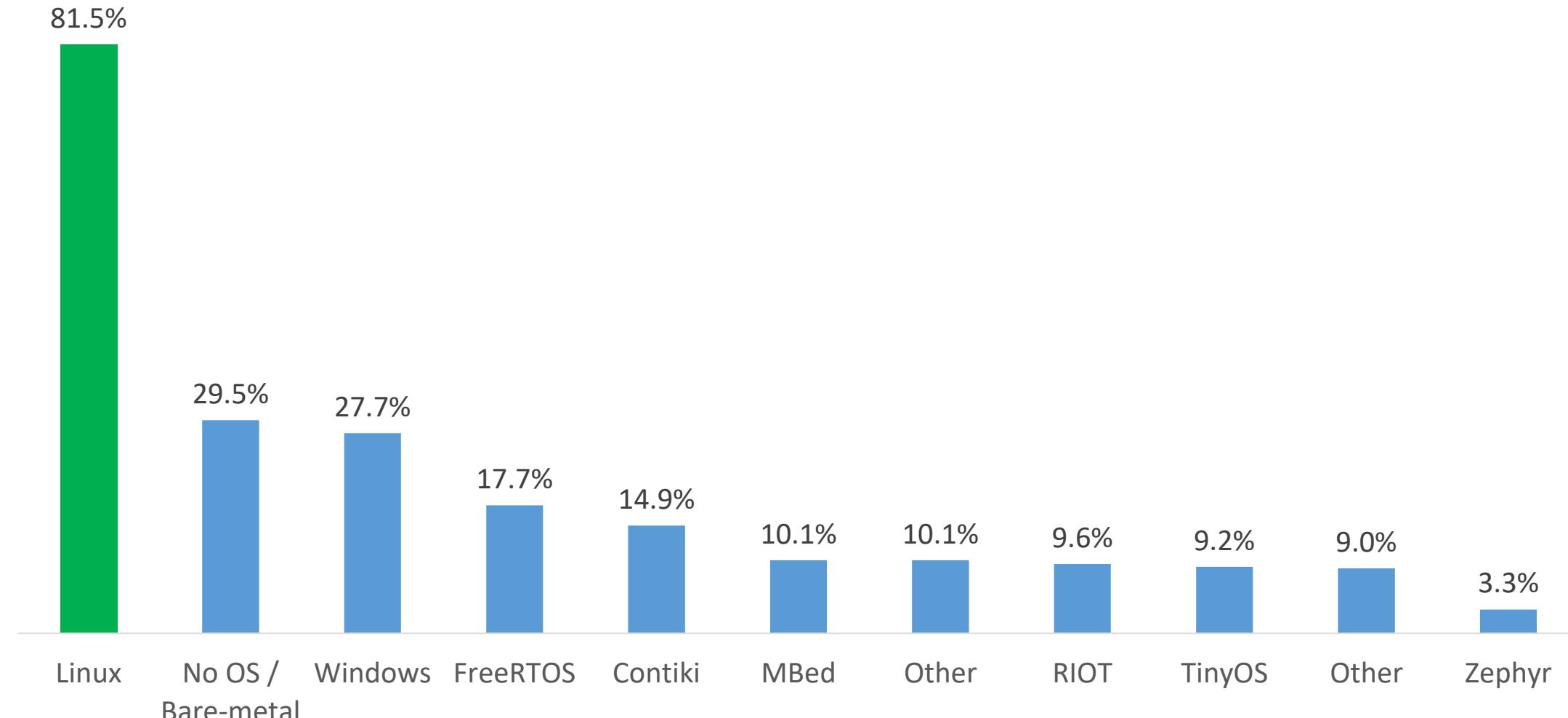
*Which of the following programming languages, if any, do you use to build IoT solutions? (Cloud Platform)*



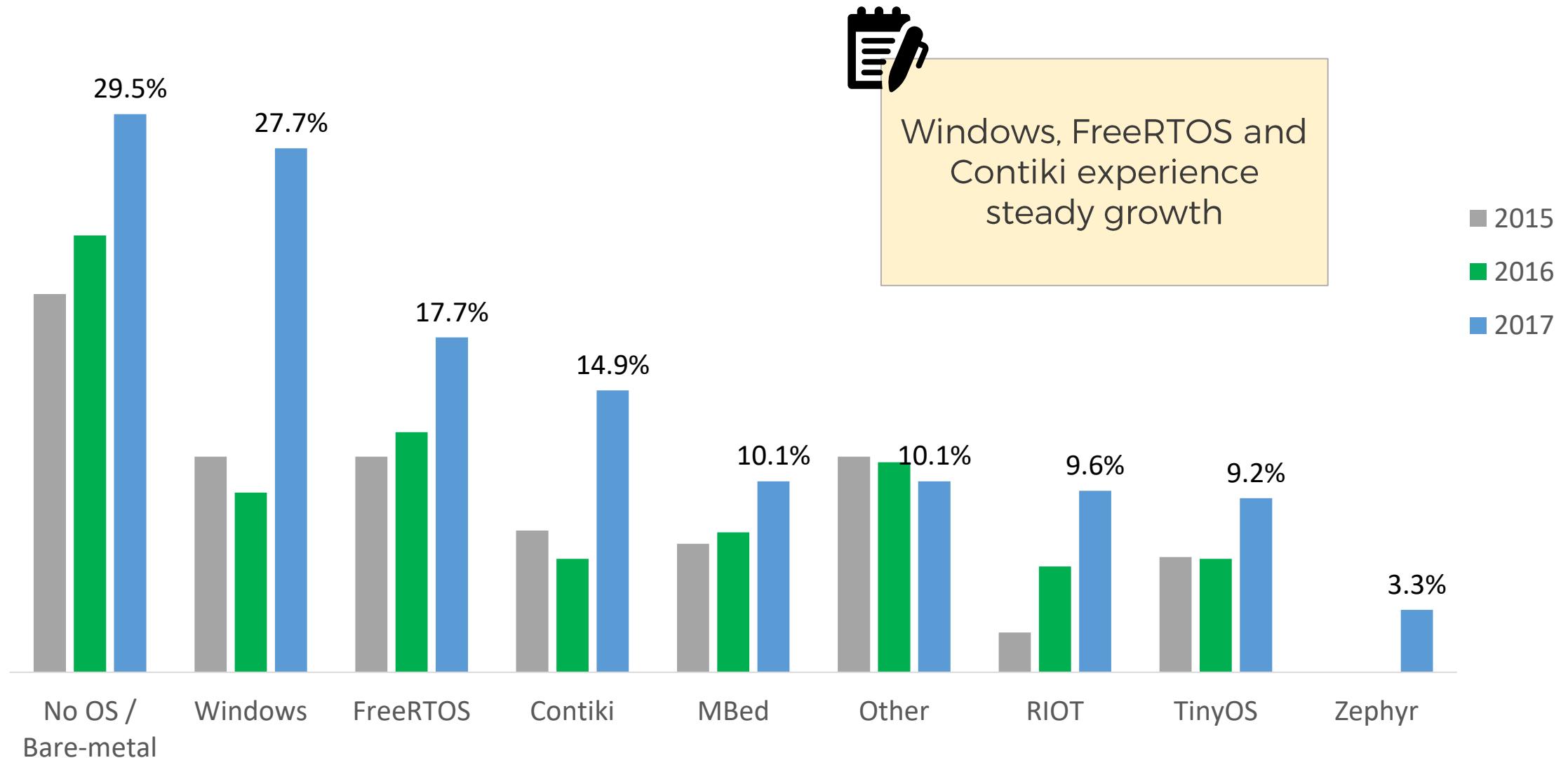
# IoT OPERATING SYSTEMS

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*Which operating system(s) do you use for your IoT devices? (Summary)*

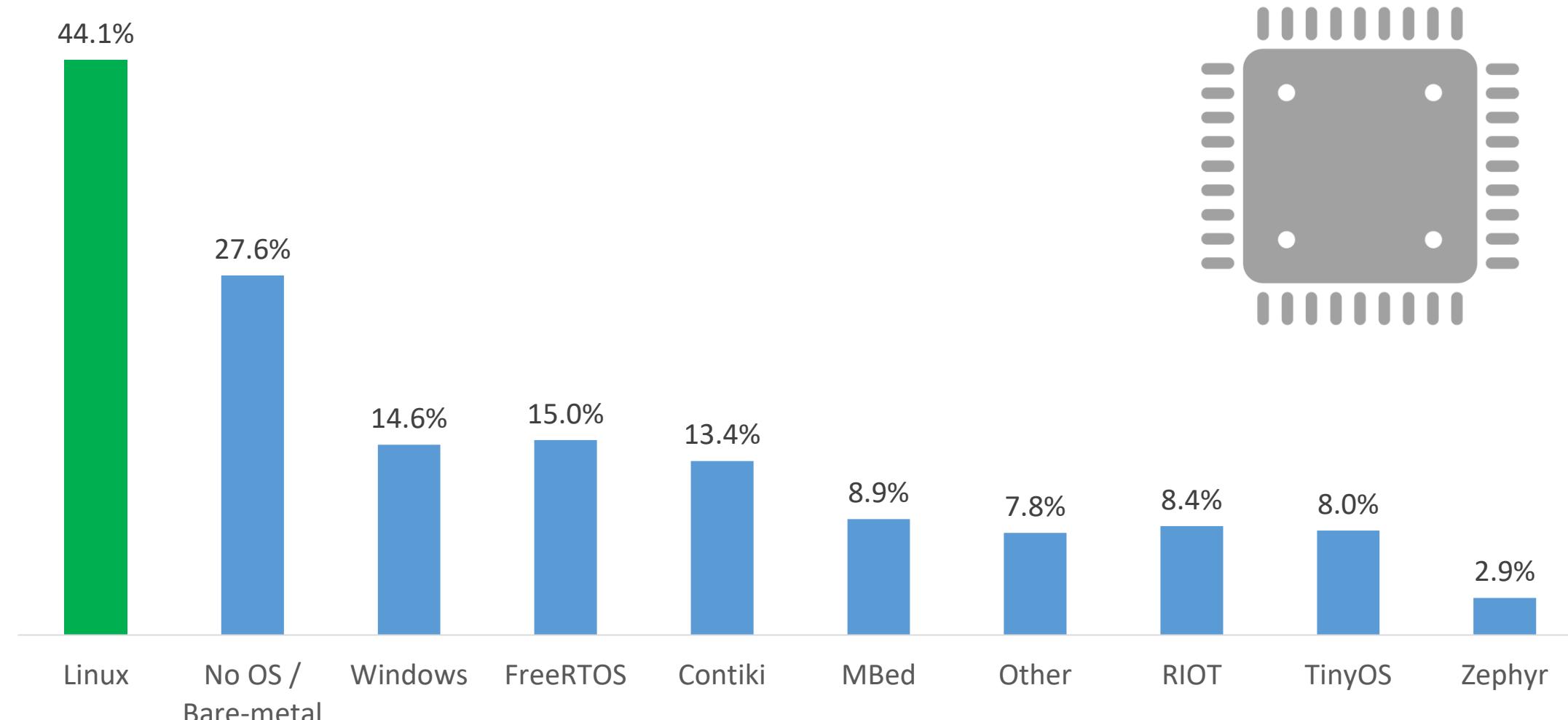


# ALTERNATIVES TO USING LINUX FOR IoT



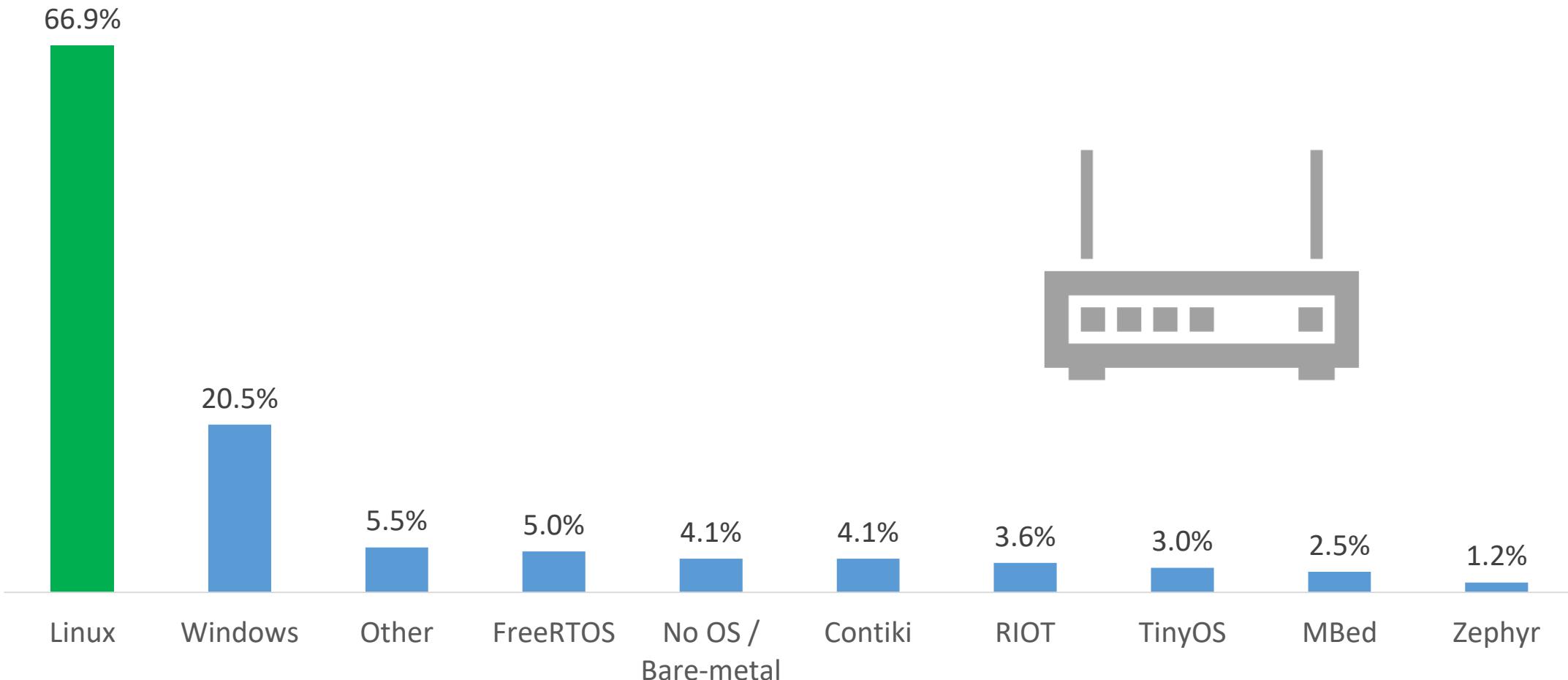
# IoT OPERATING SYSTEMS – CONSTRAINED DEVICES

*Which operating system(s) do you use for your IoT devices? (Devices)*



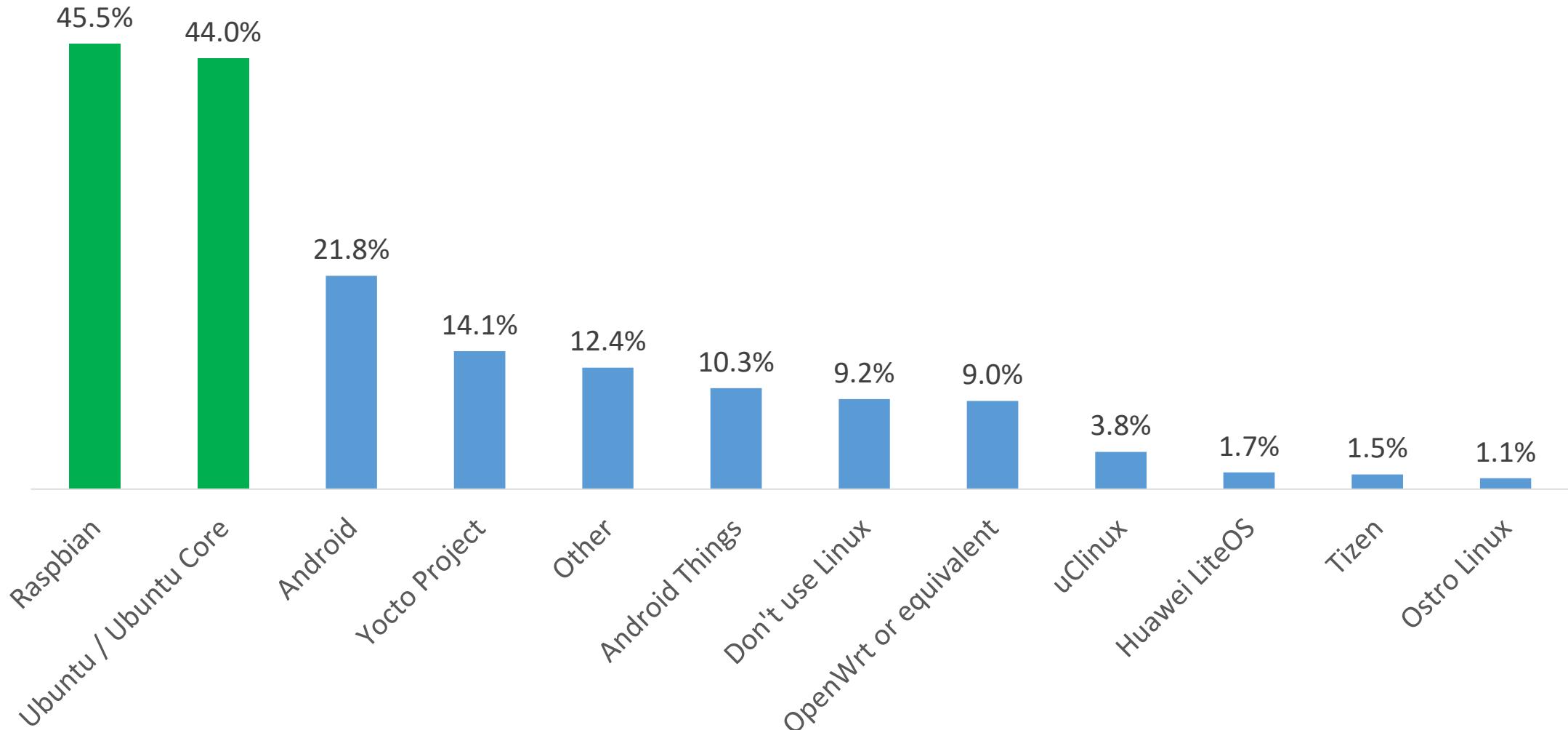
# IoT OPERATING SYSTEMS – IoT GATEWAY

*Which operating system(s) do you use for your IoT devices? (Gateway)*



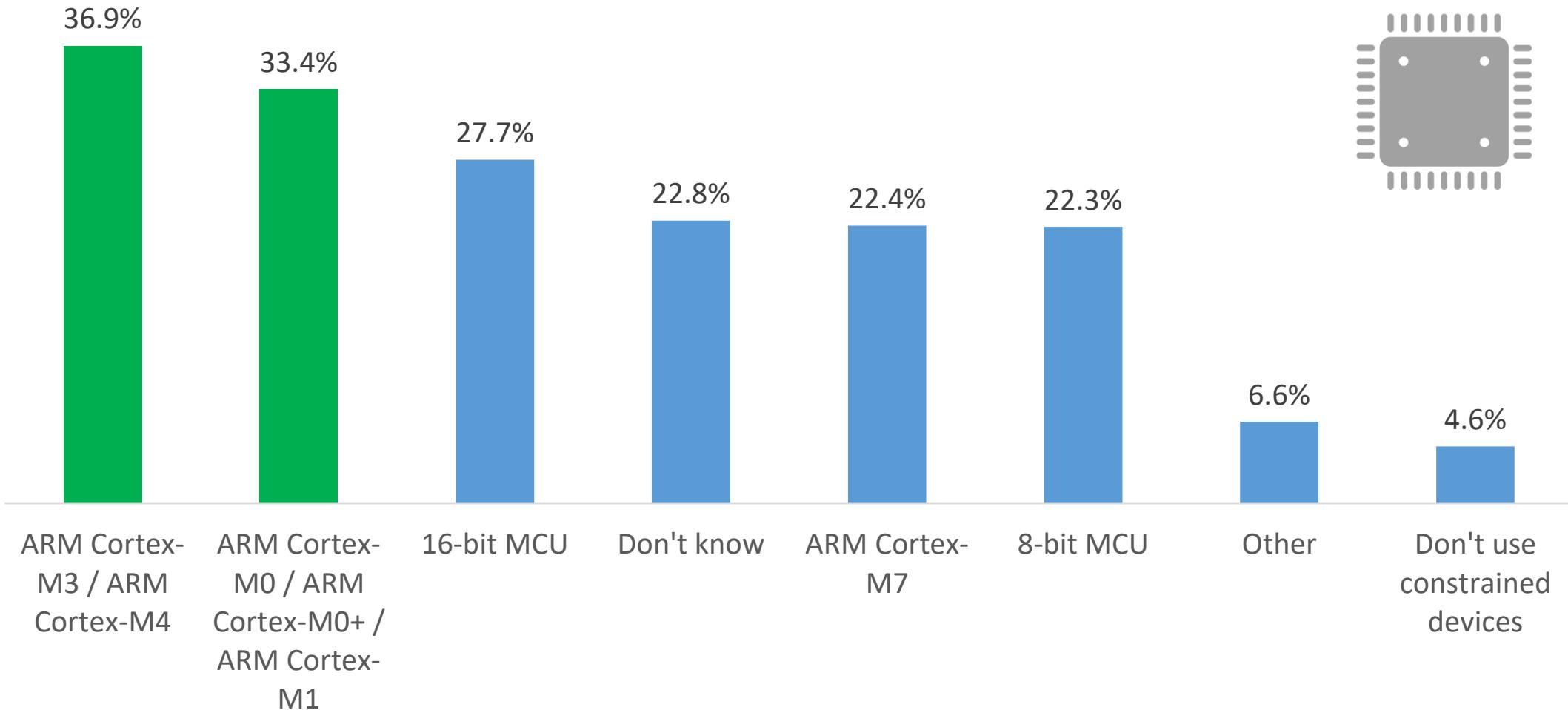
# IoT OPERATING SYSTEMS / LINUX DISTROS FOR IoT

*If you are using Linux, what distribution do you typically use for your IoT solution?*



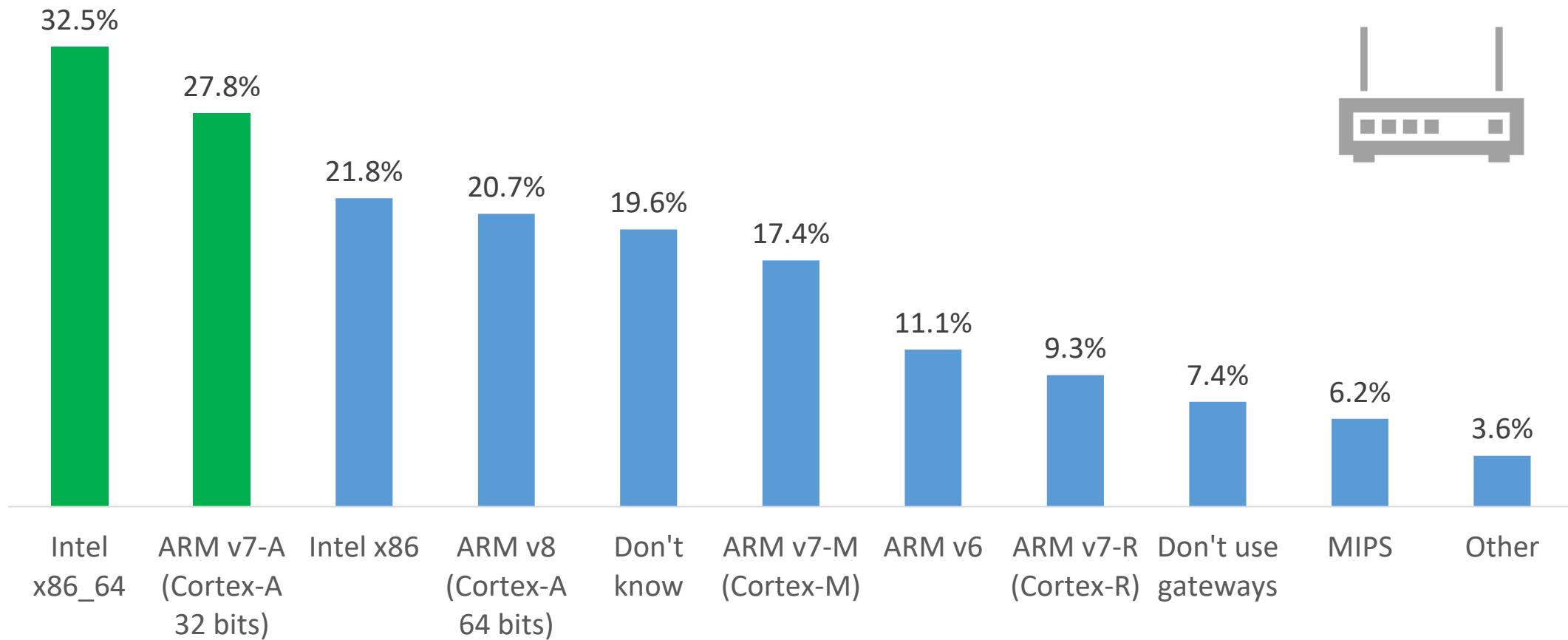
# IoT HARDWARE ARCHITECTURES

*What hardware architectures are you using for your IoT constrained device(s)?*



# IoT HARDWARE ARCHITECTURES

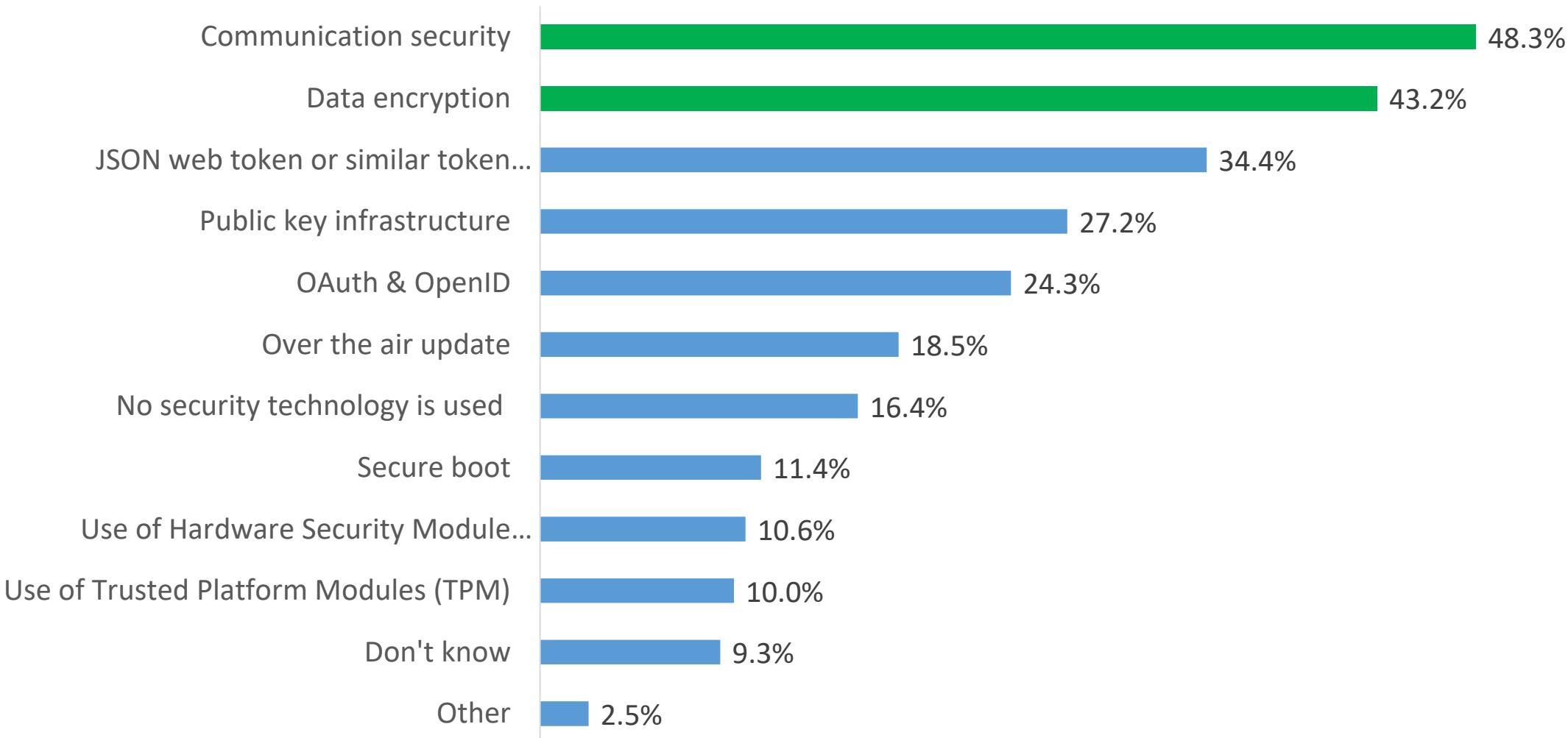
*What hardware architectures are you using for your IoT gateway(s)?*



# IoT SECURITY TECHNOLOGIES

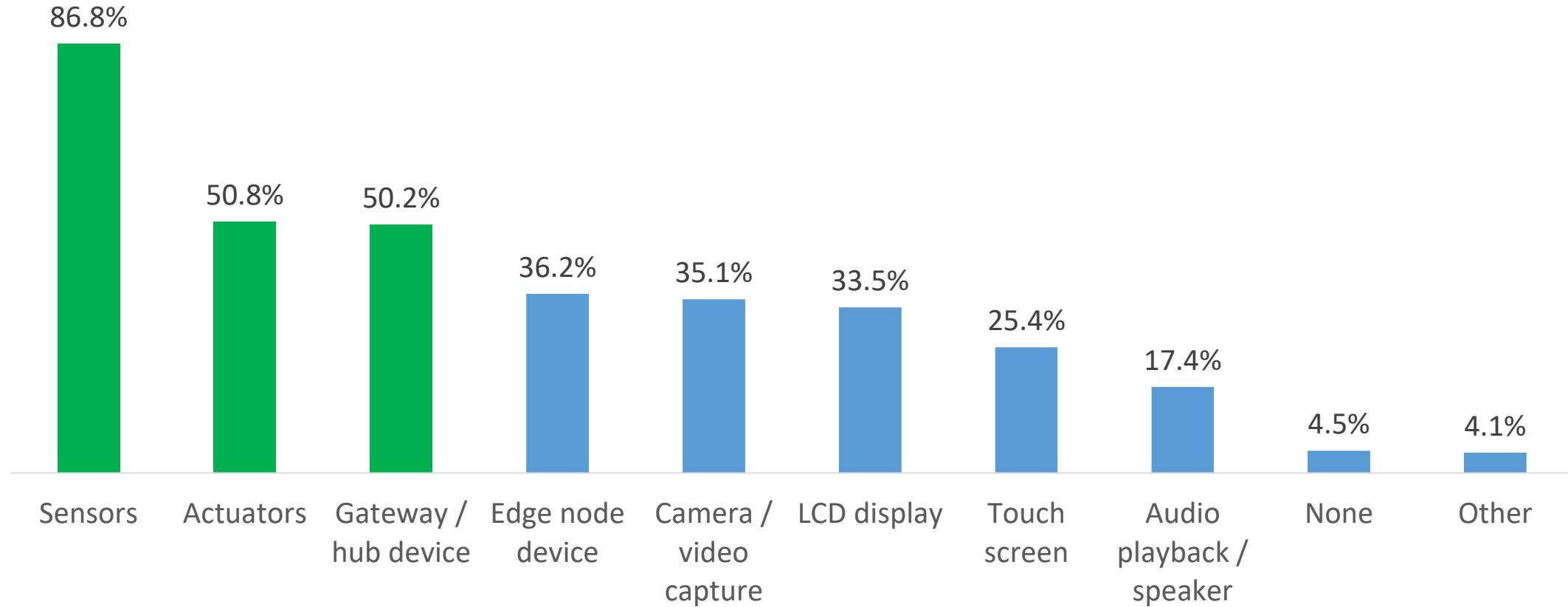
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*Which of the following security-related technologies do you use in your IoT solution?*



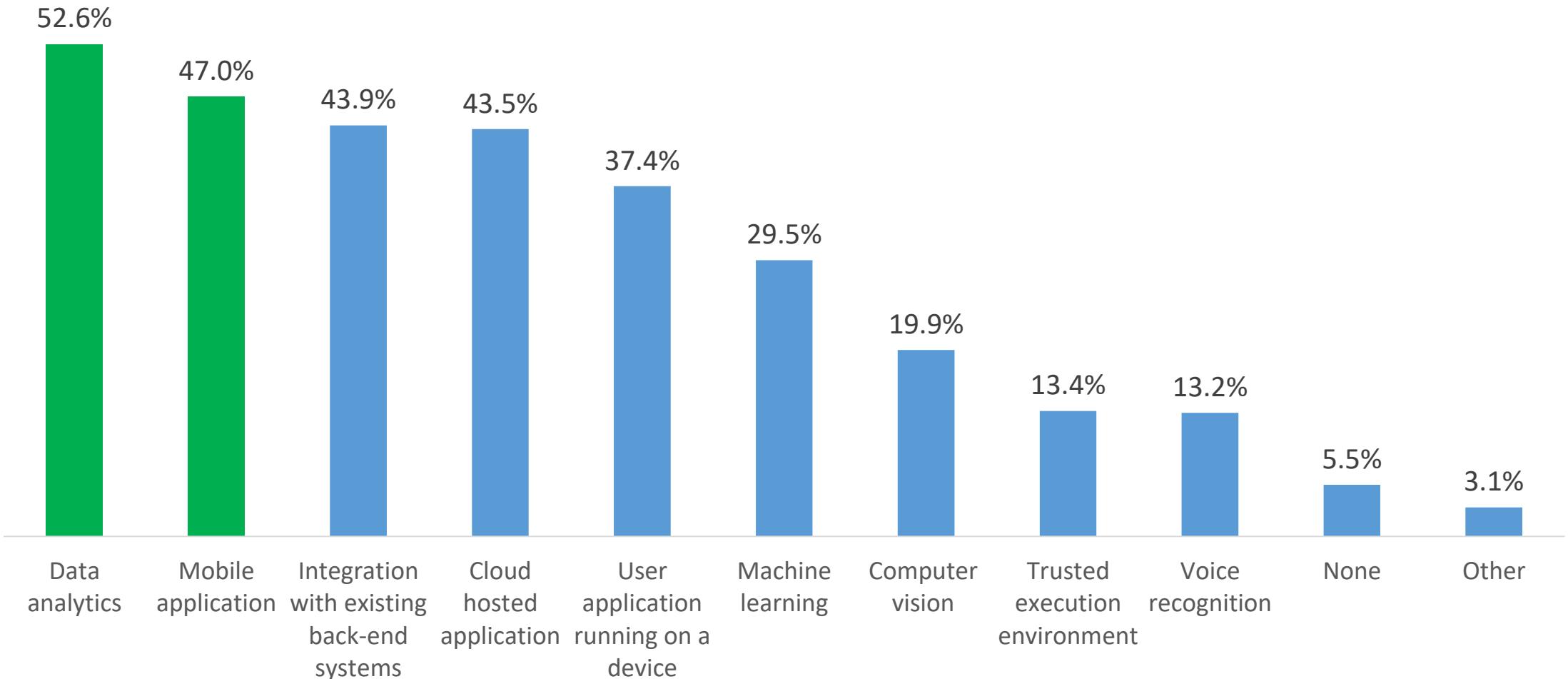
# HARDWARE COMPONENTS IN IoT SOLUTIONS

*What hardware components are included in your IoT solution?*



# SOFTWARE FEATURES IN IoT SOLUTIONS

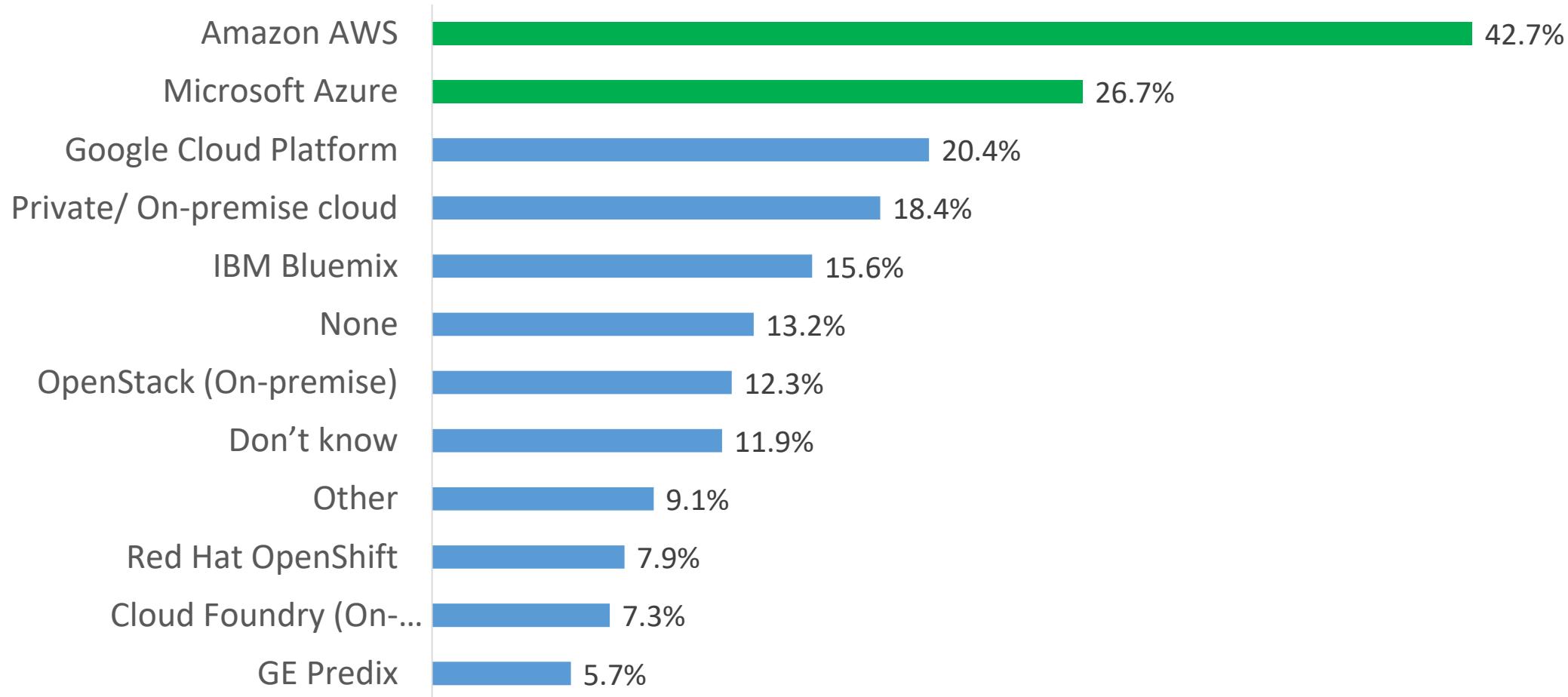
*What software features are included in your IoT solution?*



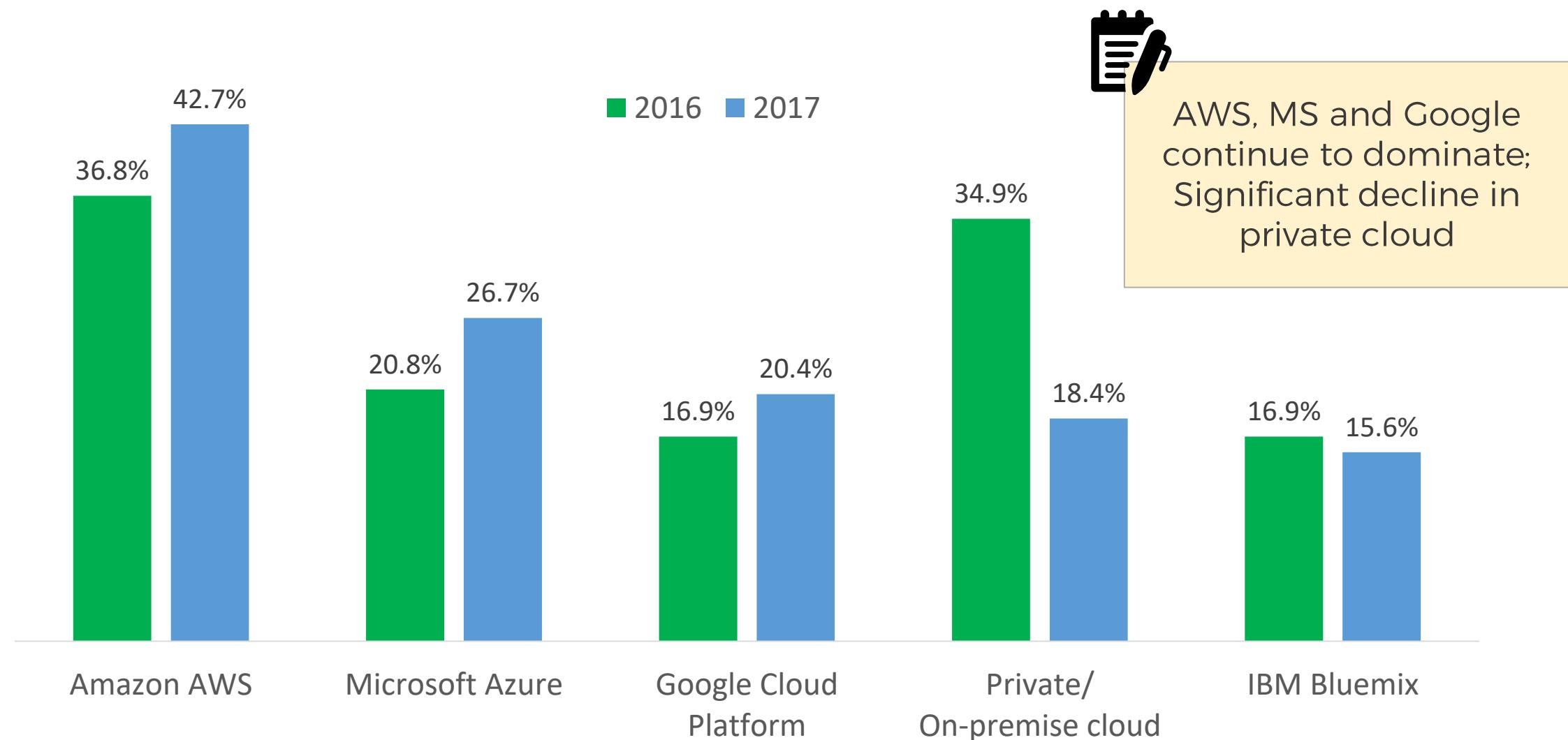
# CLOUD SERVICES FOR IoT

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*Do you use, or plan to use, any of the following cloud service offerings for implementing your IoT solution?*



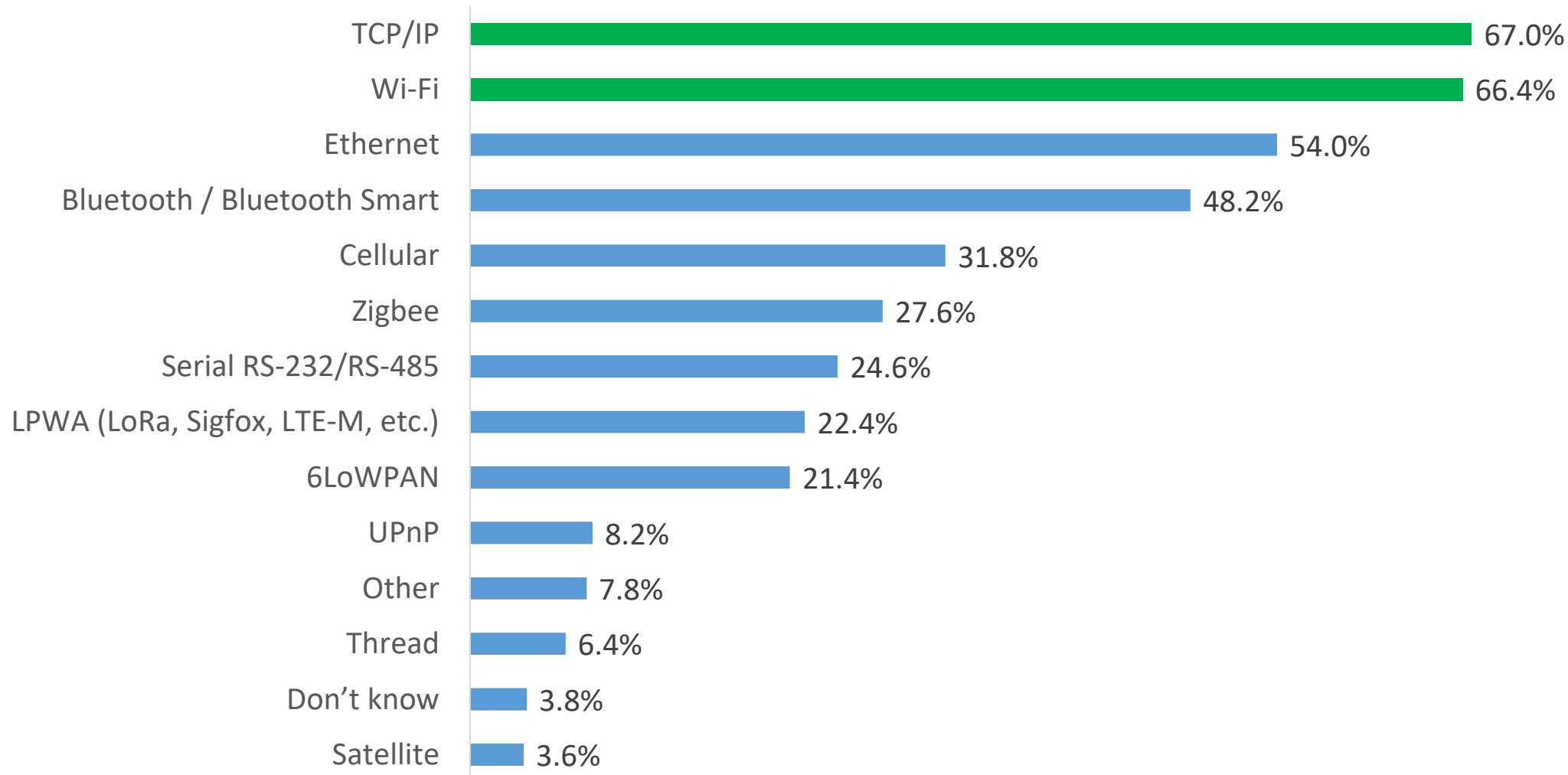
# TRENDS OF CLOUD SERVICES FOR IoT 2016-2017



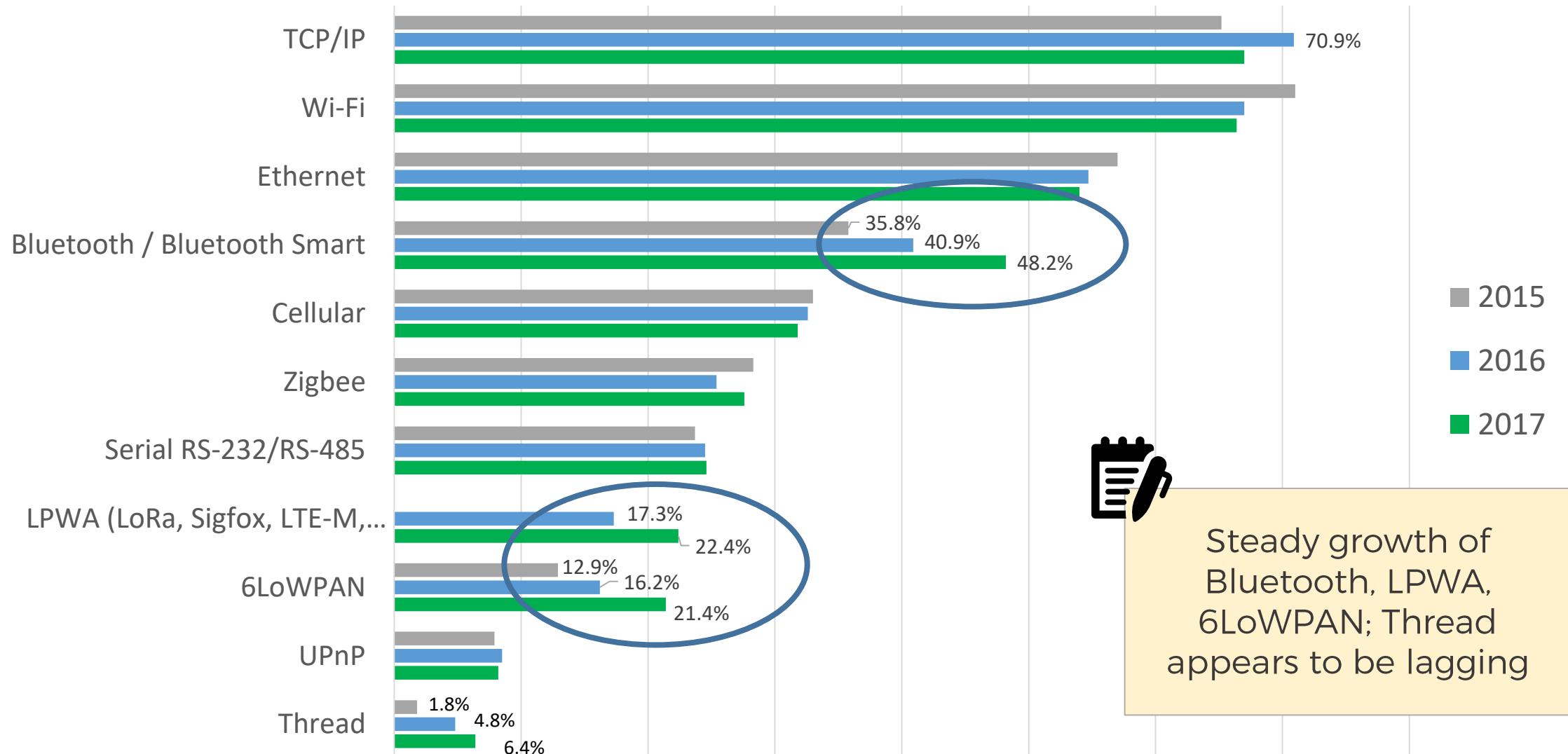
# CONNECTIVITY PROTOCOLS

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*What connectivity protocol(s) do you use for your IoT solution?*



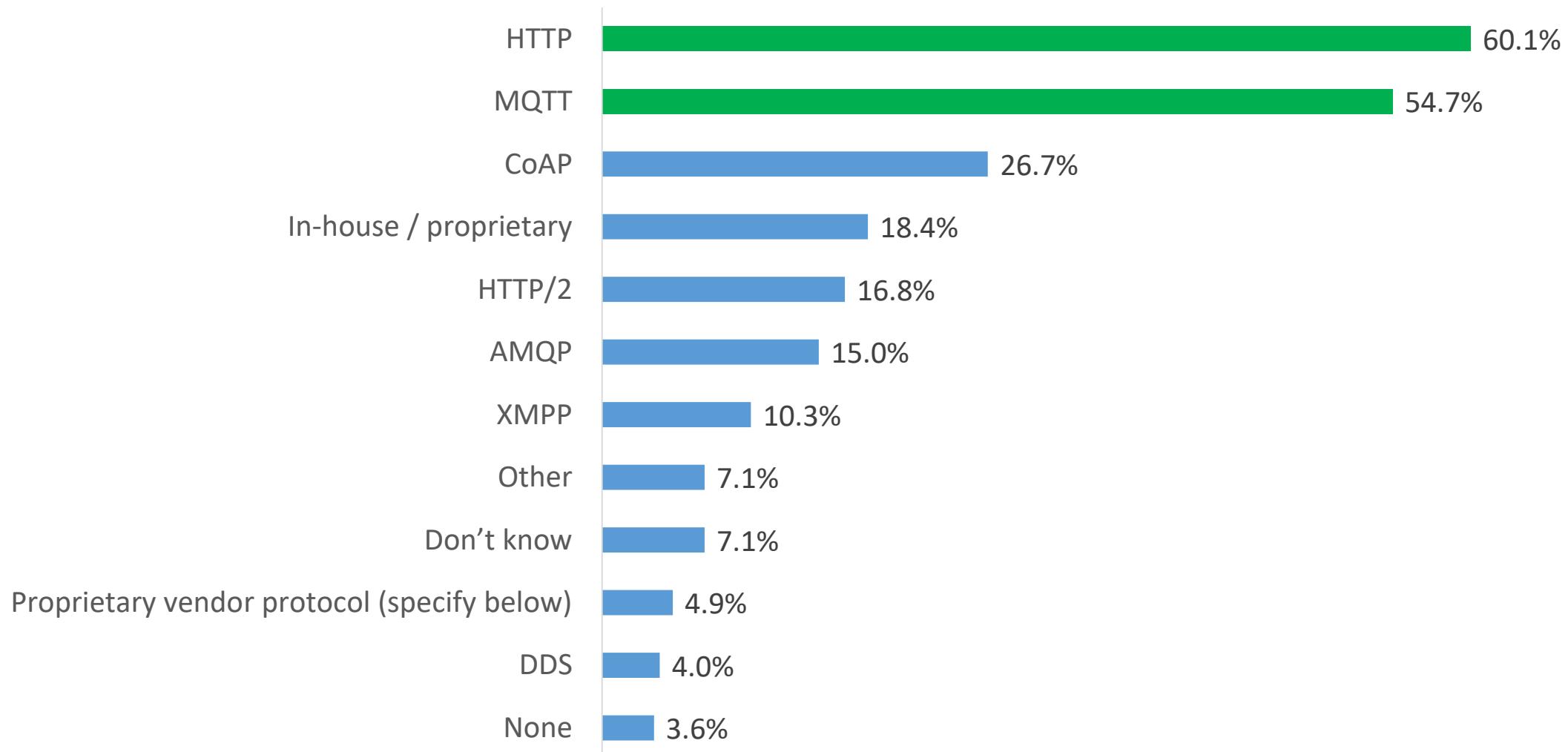
# GROWTH OF NEW CONNECTIVITY PROTOCOLS



# MESSAGING STANDARDS

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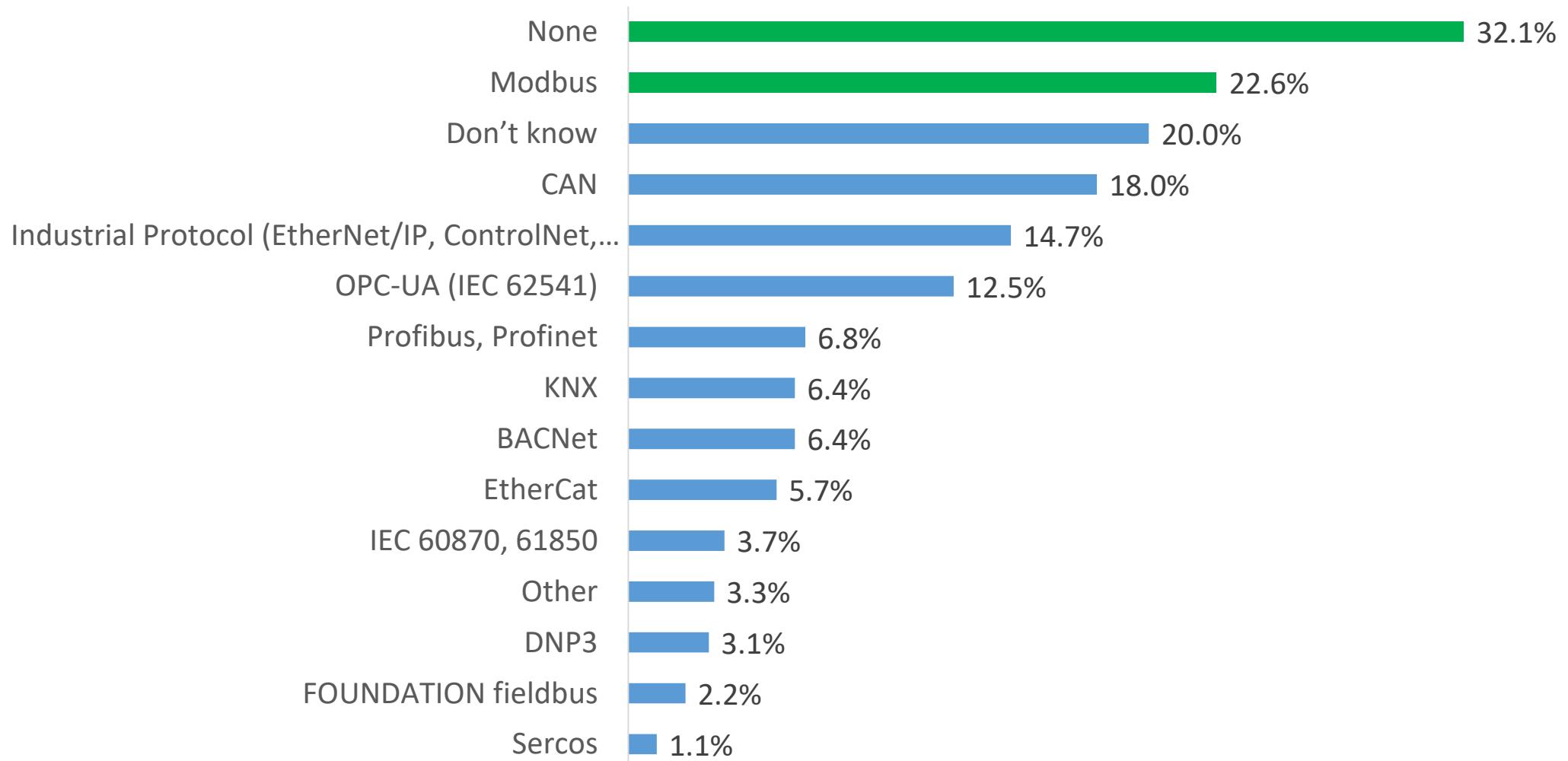
*What messaging protocol(s) do you use for your IoT solution?*



# INDUSTRIAL PROTOCOLS

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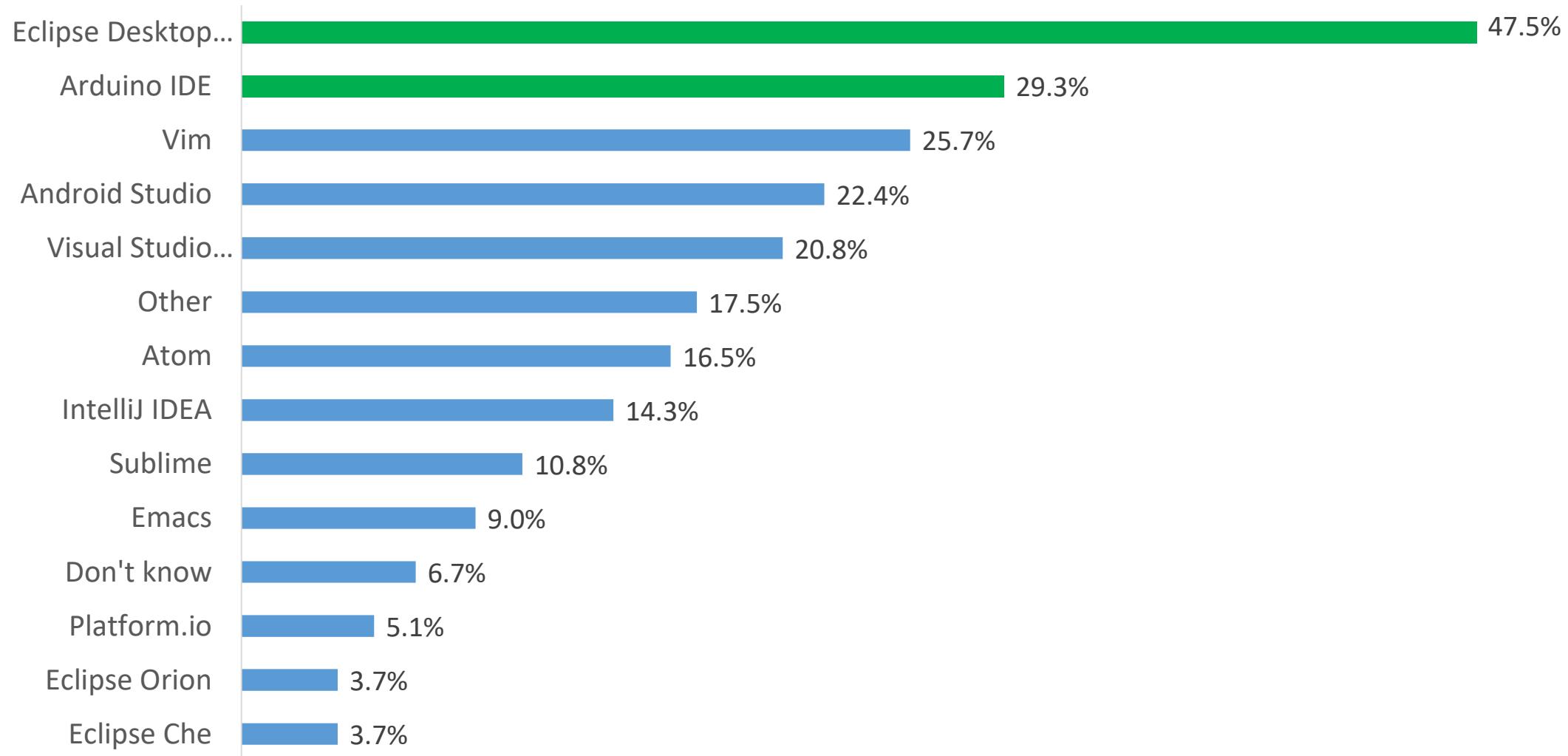
*What industrial protocol(s) do you use in your IoT solution?*



# TEXT EDITORS / IDES

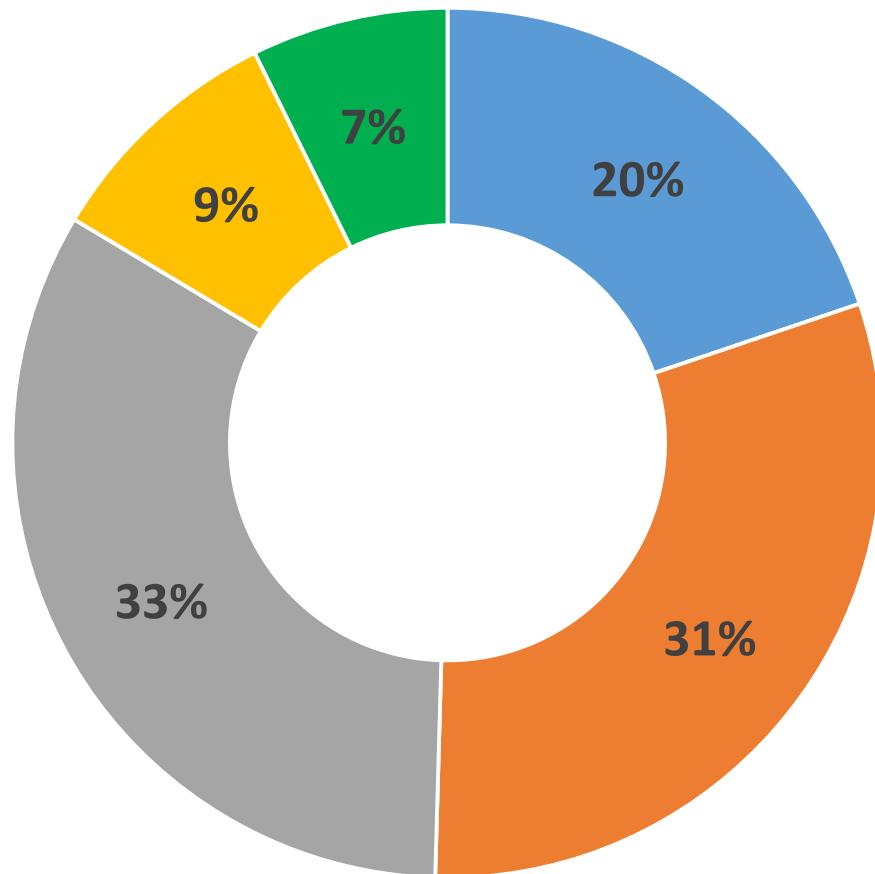
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*Which text editor(s) or IDE(s) do you use when building IoT solutions?*



# USAGE OF OPEN HARDWARE

*Have you ever used any open hardware platforms like Raspberry Pi, Arduino, BeagleBone, etc.?*



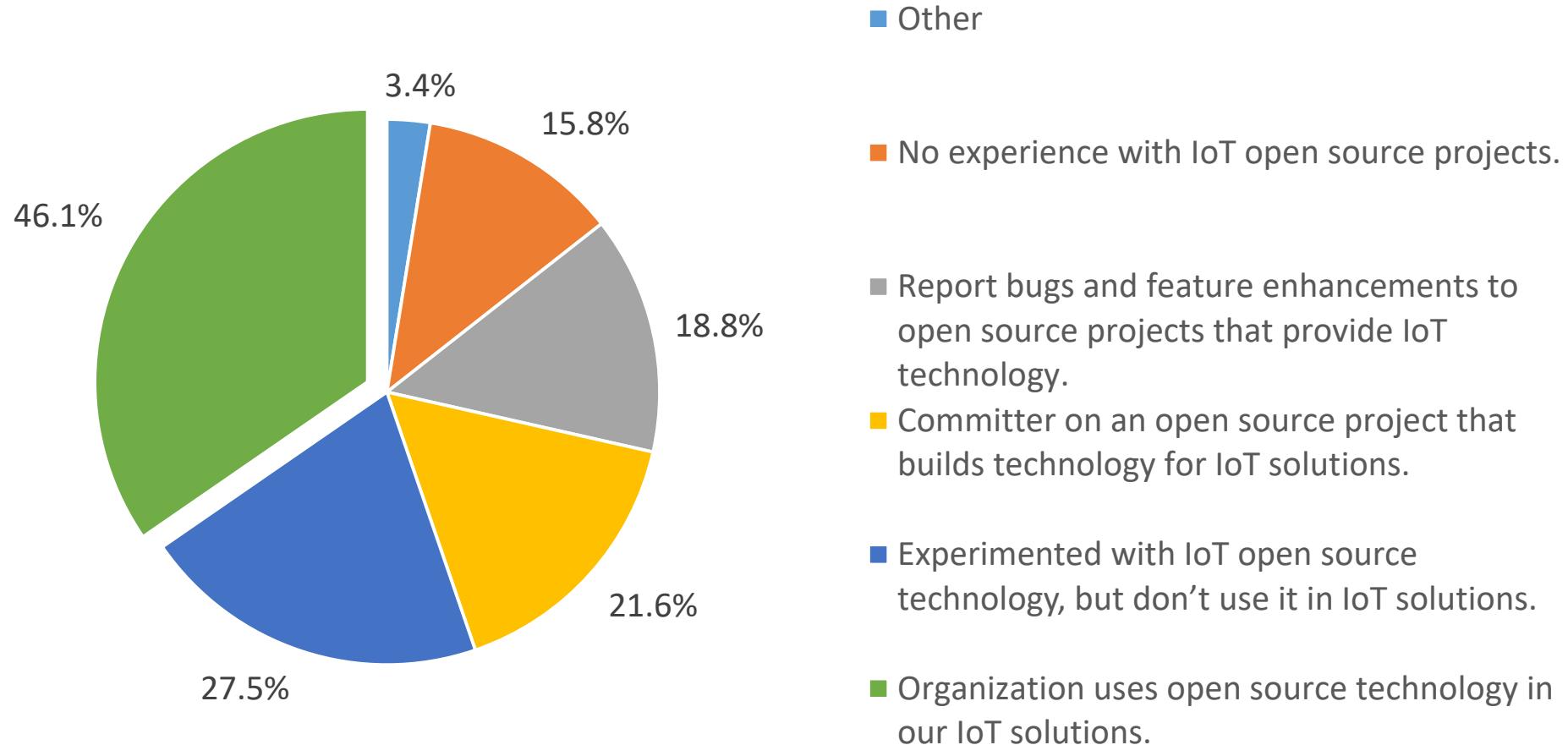
- Yes, my company deploys IoT solution using an open hardware platform
- Yes, my company prototypes IoT solutions using an open hardware platform
- Yes, I have experimented with open hardware in my spare time
- No, but I intend to experiment with open hardware in the next 6 months
- Never used open hardware



# **IoT INDUSTRY PERCEPTIONS**

# OPEN SOURCE POLICY

*Which of the following statement(s) best describes your IoT open source project participation?*



# IoT CONSORTIUMS

*How would you rank your organization's perceived importance of the following IoT Consortiums to your IoT strategy? ( 1 = Important, 5 = Never heard of them)*

	Important	Neutral	Not Important	Don't Know	Never heard of them	Average Rating
IEEE	233	125	30	51	9	1.83
Eclipse IoT	201	101	50	64	27	2.13
Apache Foundation	183	118	43	68	25	2.16
W3C	178	116	41	55	31	2.16
IETF	140	112	35	80	57	2.53
LoRa Alliance	99	113	55	83	79	2.84
Industrial Internet Consortium (IIC)	89	117	40	91	92	2.95
OASIS	50	117	55	100	90	3.15
Open Connectivity Foundation (OCF)	75	91	42	89	117	3.20
OneM2M	54	95	49	88	120	3.31
Thread Group	41	107	53	88	120	3.34
OMA	44	103	42	101	126	3.39

# EUROPEAN RESEARCH CONSORTIUMS

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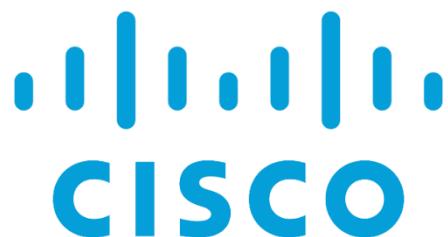
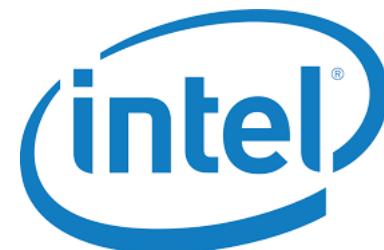
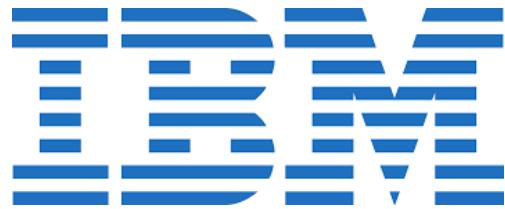
[Asked to European Respondents Only]

How would you rank your awareness for the following IoT related EU Research initiatives? ( 1 – Active Participant, 5 – No Knowledge)

	Active participant	Highly aware	Moderately aware	Somewhat aware	No Knowledge	Rating Average
FIWARE	5	25	37	27	149	<b>4.19</b>
IERC - European Research Cluster on the IoT	7	22	33	35	146	<b>4.20</b>
IoT-EPI - The European Platforms Initiative for the IoT	12	20	23	30	158	<b>4.24</b>
AIOTI - The European Alliance of IoT for Innovation	10	17	27	30	161	<b>4.29</b>
Hypercat	2	7	26	25	180	<b>4.56</b>

# TOP IoT CORPORATE LEADERS

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**BOSCH**  
Invented for life



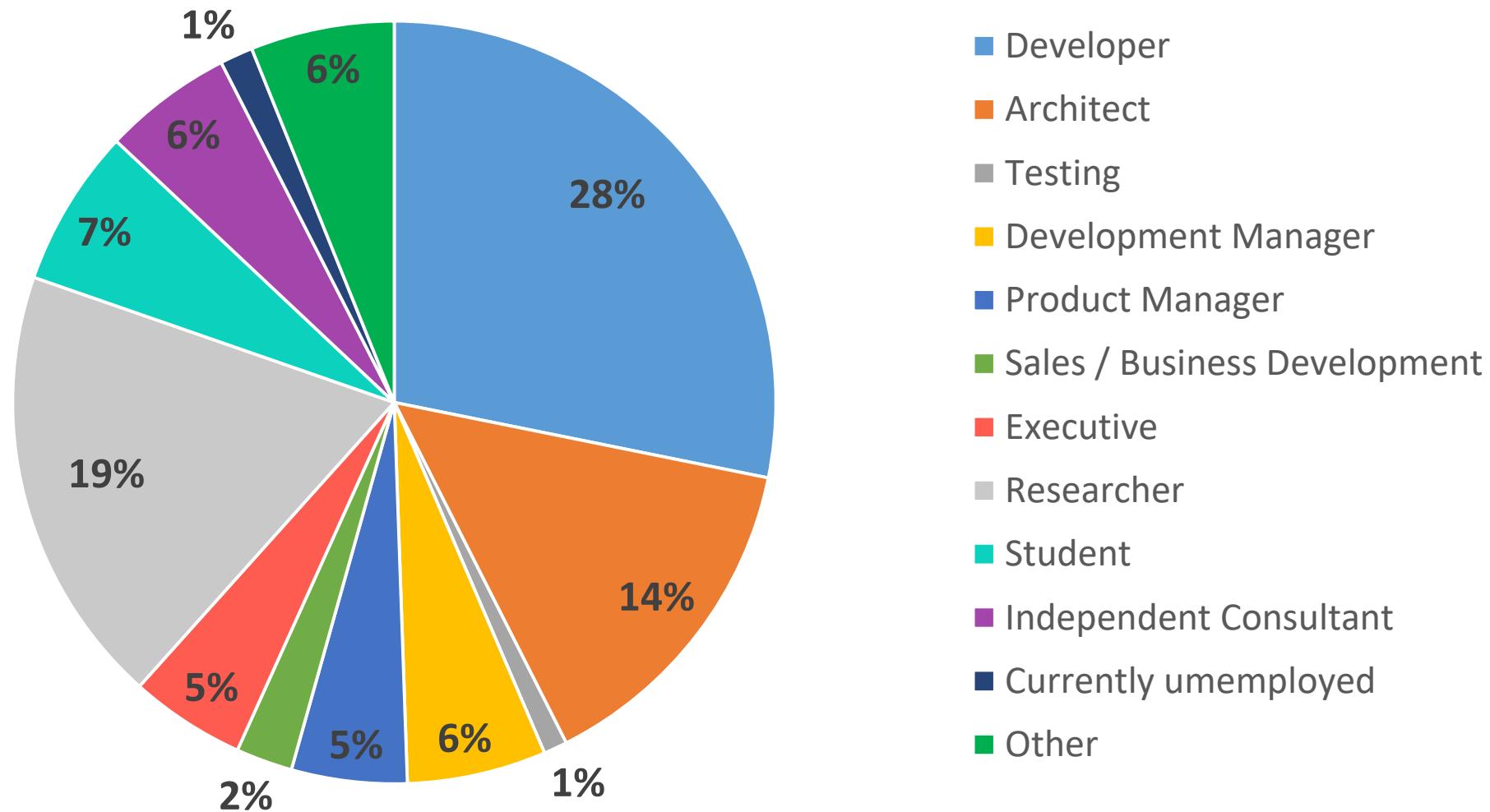


# WHO RESPONDED?

# JOB TITLE

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*What is your job title?*



# ORGANIZATION SIZE

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*How large is the organization you work for (# employees)?*

**1-49**



**50-500**



**501-5,000**



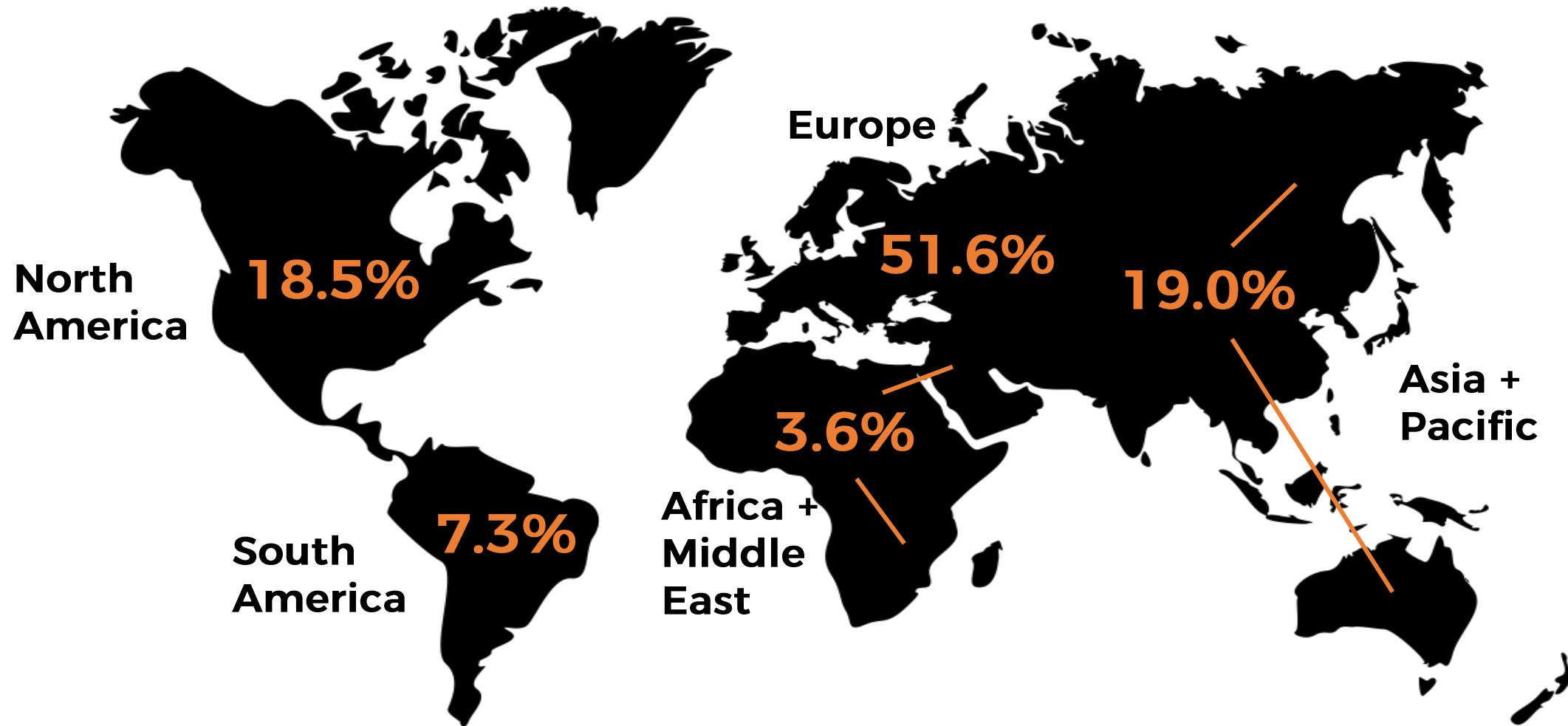
**5,000+**



# REGION

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*Where do you live?*





# **DIFFERENT RESPONDENT POOLS**

# DIFFERENT RESPONDENTS POOLS

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The Survey was jointly sponsored by the Eclipse IoT Working Group, IEEE IoT and the AGILE IoT research project. Each sponsor group promoted the survey to their community.

A total of **713 individuals participated in the survey**. There were 255 respondents from the Eclipse community and 257 from the IEEE community. Given the size of these respondent pools, it is interesting to look at the differences between these two community.

The next page provides the details on the main differences. In general,

- It appears the experience within the IEEE community is more focused on research, while the Eclipse community was more likely to be working in deploying IoT solutions
- The language of choice in the Eclipse community was Java/C and in the IEEE it was C/Python.
- MQTT was a lot more popular in the Eclipse community.
- It would appear usage of AWS and Private Cloud is more popular within the Eclipse community
- For connectivity protocols, LPWA, 6LoWPAN and Bluetooth are all more popular in the IEEE community.

# DIFFERENCES BETWEEN IEEE AND ECLIPSE IoT

Topic	All	IEEE	Eclipse IoT
<b>Experience with IoT</b>	Develop IoT Solutions (34.6%) Research IoT Solutions (20.2%)	Develop IoT Solutions (26.5%) Research IoT Solutions (27.6%)	Develop IoT Solutions (39.6%) Research IoT Solutions (11.4%)
<b>Language Usage</b>	Java (60.8%) C (60.5%) C++ (48%) Python (46.6%)	C(62.5%) Python (54.8%) C++(52.9%) Java (51.4%)	Java (73.5%) C (56.6%) JavaScript (42.8%) C++ (41.3%)
<b>Security</b>	Comm (48.3%) Encryption (43.2%) OTA (18.5%)	Encription (44%) Comm (40%) OTA (14%)	Comm (51.8%) Encrypt (40%) OTA (22.3%)
<b>Cloud Provider</b>	AWS (42.7%) MS Azure (26.7%) GCP ((20.4%) Private (18.4%)	AWS (39.7%) MS Azure (25.6%) GCP (22.1%) Private (14.1%)	AWS (49.4%) MS Azure (29.6%) Private (21.6%) GCP (20.4%)
<b>Message Protocol</b>	HTTP (60.1%) MQTT (54.7%) CoAP (26.7%)	HTTP (52.8%) MQTT (43.6%) CoAP (24.6%)	MQTT (66.7%) HTTP (61.8%) CoAP (24.8%)
<b>Connectivity</b>	Bluetooth (48.2%) LPWA (22.4%) 6LoWPAN (21.4%) Thread (6.4%)	Bluetooth (50.5%) 6LoWPAN (26.8%) LPWA (25.8%) Thread (5.8%)	Bluetooth (43.2%) LPWA (19.1%) 6LoWPAN (11.7%) Thread (4.3%)

# CONTACT INFORMATION

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[iot.eclipse.org](http://iot.eclipse.org)

 [@Eclipselot](https://twitter.com/Eclipselot)



[iot.ieee.org](http://iot.ieee.org)

 [@IEEEIoT](https://twitter.com/IEEEIoT)



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 [@agile\\_iot](https://twitter.com/agile_iot)



[theinternetofthings.eu/](http://theinternetofthings.eu/)

 [@rofvank](https://twitter.com/rofvank)