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Connectivity Certification Webinar

Sept 20th 2024

innovating safety & security

What is Connectivity ?

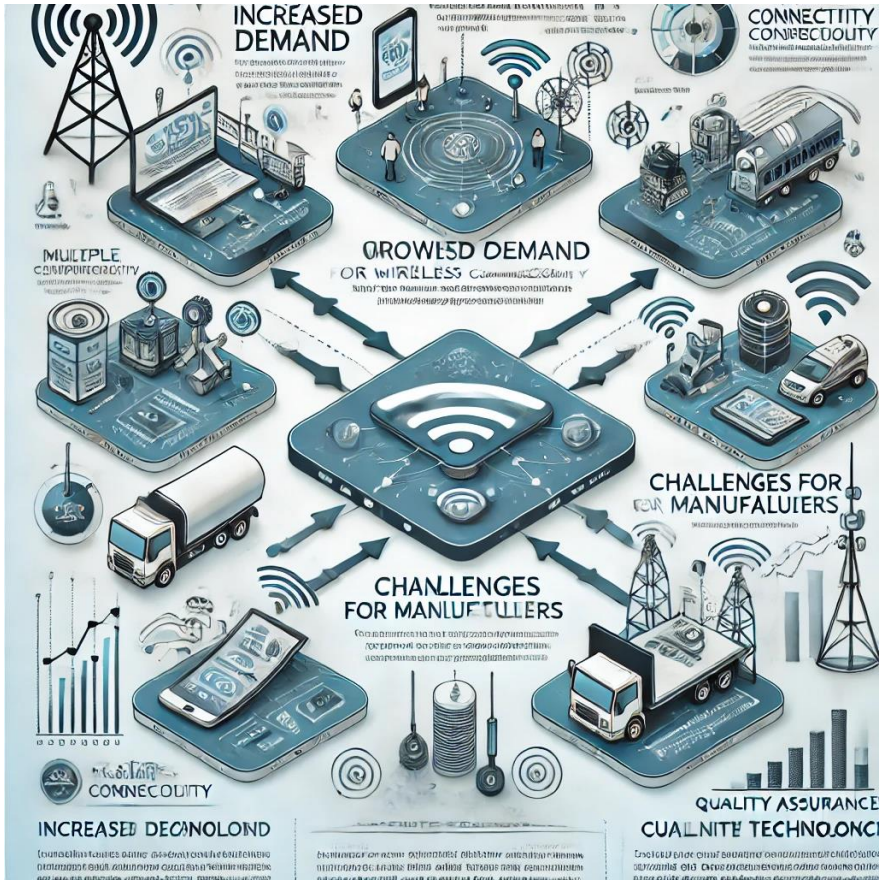
As society demands **more connectivity** in products and services, companies must adapt to this new era of communication. Devices that once required physical operation now need to be managed remotely.

Applications, devices, vehicles, and machinery must all be **connected** to the internet.

The **demand** for **wireless connectivity** has recently **increased**, extending beyond a single technology to encompass multiple solutions.

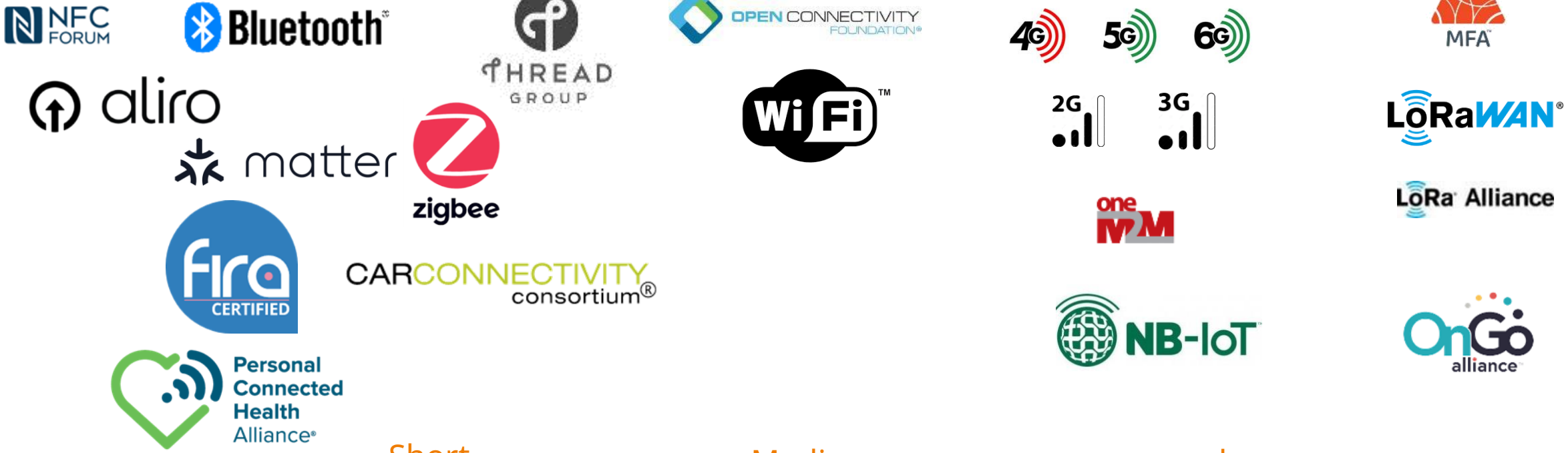
This presents **challenges for manufacturers** who are not accustomed to dealing with connectivity certifications or ensuring the quality of communications in their products. It's not just the large buyers or end customers who require connectivity—quality managers within companies also have a stake in this process.

This presentation will provide an overview of **connectivity certifications** for those who want to learn more or are just starting out.



What technologies for connectivity ?

Wireless



Near — Short — Medium — Long distance

Wired

Key aspects of each technology ?

1. Range (Near, Short, Medium, Long
2. Data Throughput
3. Latency
4. Frequency need licensed ?
5. Power or battery consumption
6. Security Level
7. Form factor of the product
8. Robustness to Interferences
9. Chipset and components costs (power Amplifiers)
10. Number of users to reach
11. Integration Efforts (Time and Mone
12. **Certification Costs**

Technology	Description	Key Advantages	Common Applications
Wi-Fi	Standard wireless technology for local area networking.	High data rates, wide adoption, and excellent range.	Smart homes, offices, industrial automation.
Bluetooth	Short-range wireless technology for low-power devices.	Low energy consumption, easy pairing, and low cost.	Beacons, monitors, network connectivity.
LoRaWAN	Long-Range Wide Area Network technology for IoT.	Extended range, low power, and deep indoor penetration.	Smart agriculture, smart cities, asset tracking.
NB-IoT	Narrowband IoT technology for cellular networks.	Low power, reliable connectivity, and security features.	Smart meters, remote monitoring, logistics.
Zigbee	Low-power, low-data-rate wireless technology for short-range IoT.	Mesh networking, low interference, and scalability.	Home automation, lighting control, sensor networks.
5G	The latest generation for mobile cellular networks	offers high data rates, ultra-reliable low latency, and massive device connectivity	Home and industrial applications

Others criteria like trending technologies, or specific vertical market requests to be considered

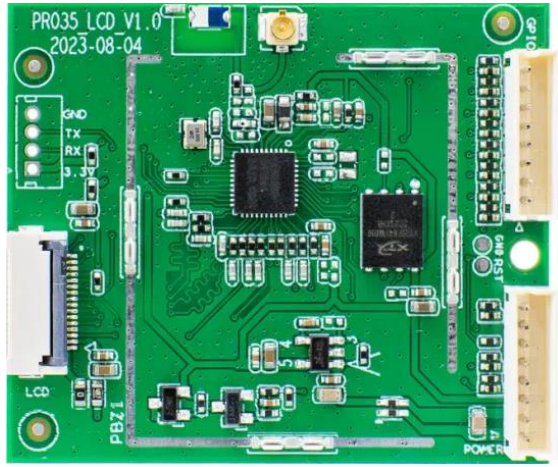
Connectivity Technologies, implementations: Example I

Some devices need to add more than one wireless and wired technologies.

- 1st Main Technology is considered the one allowing to connect to Internet. I.e. WiFi. You can stream music using a very fast **WLAN interface**.
- 2nd Technology is the one allowing to connect personally to the device using your smartphone, smartwatch or tablet. i.e. **Bluetooth**

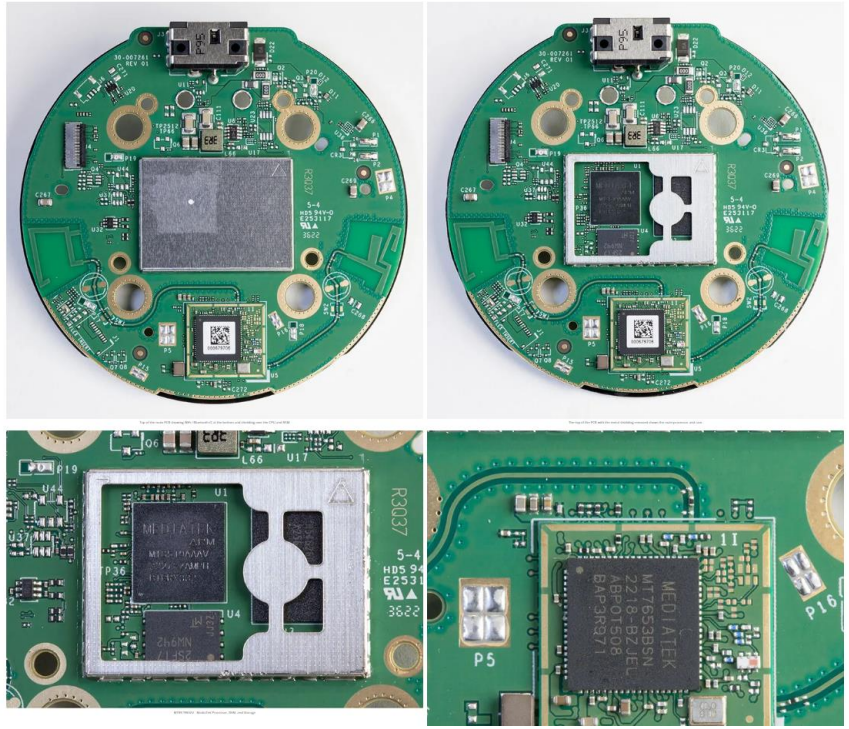
Example Bluetooth and WiFi Speaker.

There are speakers that also includes Near Field Communication (NFC) that facilitates the pairing with your smartphone.



Connectivity Technologies, implementations: Example II

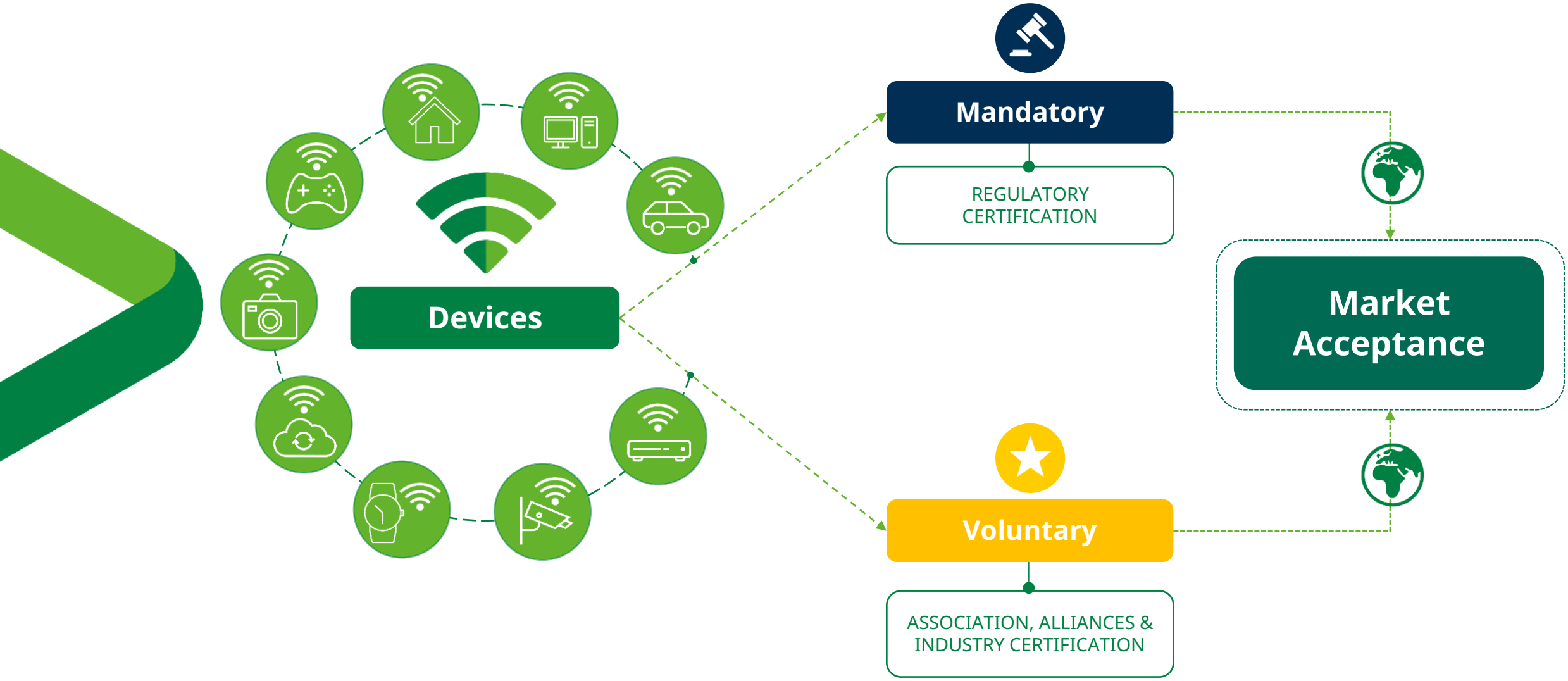
Another interesting device is the Amazon Echo (any model) – 6 Technologies



1. THREAD is the wireless layer for many apps
2. MATTER new generation SmartHome Control Tech over THREAD
3. Zigbee – for legacy generation of lights control
4. Bluetooth Low Energy (5.4) for Personal Connection
5. WiFi for Internet
6. Sidewalk over Bluetooth for Echo Bridges Mesh Network

Connectivity Certification

Connectivity Certification



Connectivity Certification

Certifications

Connectivity Certifications are essential **when regulatory requirements cannot guarantee** that devices meet functional performance.

Added Value

Considered an **optional enhancement,** certification schemes can be necessary for product entry in certain markets.

Compliance

Some **big buyers** like Network Operators (AT&T, Docomo, China Mobile, Telefonica, Orange), Retailers (Walmart, Carrefour, etc.) or large OEMs like BMW and GM, do not buy connected products if they are not certified according to connectivity standards.

Intellectual Property Rights

Some connectivity technologies are **protected by intellectual property rights, so** in order to use them, it is a must to achieve an official certification.

Technologies vs Certification Programs

Technologies

Radio Freq ID & Near Field Communication

Wireless Local Area Network

Bluetooth

zigbee aliro matter

THREAD

2G 3G Lte 5G 6G NB-IoT

4G 5G 6G LTE-M

UWB

LoRaWAN

Associations

NFC FORUM

Wireless Fidelity Alliance

Bluetooth SPECIAL INTEREST GROUP

csa connectivity standards alliance

THREAD GROUP

GCF Global Certification Forum

PTCRB

oneM2M

OnGo alliance

MFA MulteFire Alliance

ctia Everything Wireless

Fine Ranging Consortium

LoRa Alliance

OPEN CONNECTIVITY FOUNDATION

Personal Connected Health Alliance

CARCONNECTIVITY consortium®

All these associations promote the technologies and define certification programs with interoperability, functional, performance requirements to go beyond regulatory.

Associations & Industry Connectivity Certifications for Mobile Devices

Mobile Communications

PTCRB

GCF Test Certify Connect

ctia Everything™ Wireless

3GPP

Unlicensed Bands

MFA

OnGo alliance

Wi-Fi®

Wi Fi ALLIANCE AUTHORIZED TEST LABORATORY

Car Connectivity Consortium

Cybersecurity

NFC - RFID

NFC FORUM

Bluetooth®

Bluetooth

Aliro

aliro

Continua®

Continua

- USB
- Bluetooth
- ZigBee
- BLE

OCF

OPEN CONNECTIVITY FOUNDATION

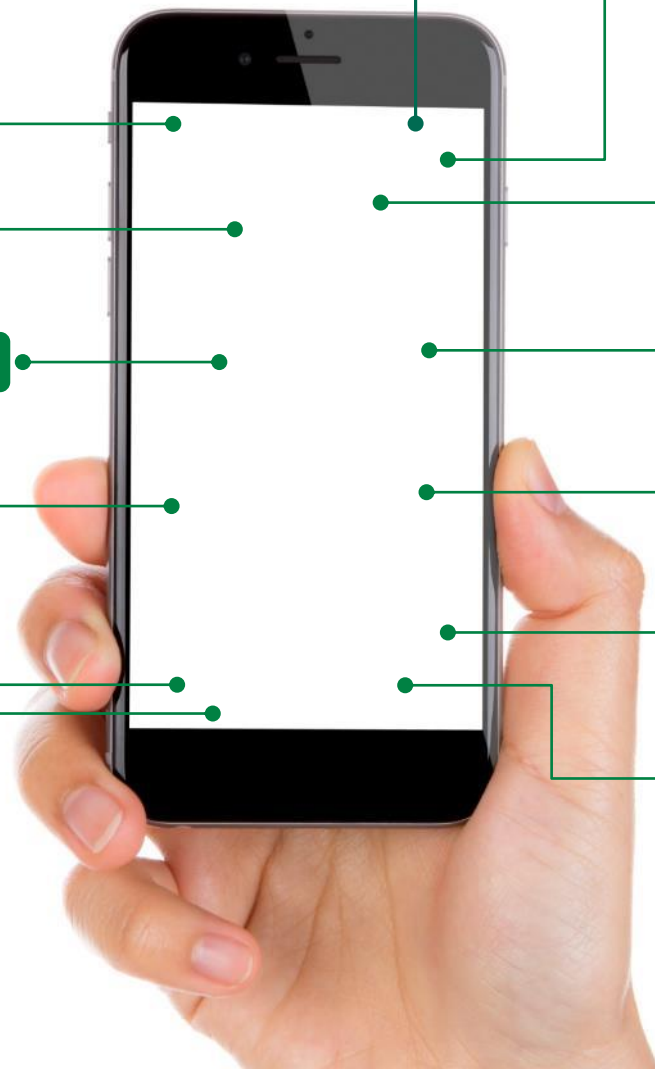
Apple MFi Car Key

User Experience

- Performance, WiOT (Wireless Interoperability), Field Test, Functional Test, Benchmarking)

Carriers

Telefónica docomo vodafone



Association & Industry Connectivity Certifications for all Industries

- EMC Testing
- RF / RSE Testing
- SAR and MPE Testing/Assessment
- CE NBEO
- FCC/ISED C2PC
- Safety CB scheme

CE, FCC/ISED, CHINA

International Type Approvals

Brazil Taiwan Australia Japan

LoRa Alliance™

- End Devices

CSA

- Wi-Fi (IoT)

Zigbee

C-V2X / DSRC

- Connected Driving
- Autonomous Driving

- UWB
- Bluetooth
- NFC
- Applet Functional
- Security
- Functional
- User Experience
- Vehicles
- Test Benches
- Smartphones / Smart Watches

Apple MFi Car Key

Car Connectivity Consortium

Thread

UAVs Testing and Certification (Drones)

Bluetooth®

Wi-Fi®

oneM2M

Continua®

- USB
- Bluetooth
- ZigBee
- BLE

Cybersecurity

Mobile Communications

- Electrical SIM
- eCall, MMI, SMS, NITZ
- GCF/PTCRB RSE
- GCF/PTCRB and AT&T OTA
- GCF Field Trials
- GCF ACE Service
- AT&T
- Vodafone OTA
- CTIA Battery Compliance Certification
- CTIA OTA Performance Converged Device
- CTIA OTA Performance MIMO
- CTIA OTA Performance SISO
- CTIA IoT Cybersecurity Certification

NFC - RFID

OCF

Amazon WWA

What are main requirements to meet for Connectivity Certification ?

Requirements	BT	NFC	WFA	Mobile GCF/PTCRB
Radiofrequency (RF) conformance	Yes	No	No	Yes
Radiofrequency (RF) Performance	No	Yes	Yes	Yes
Protocol conformance	Yes	Yes	No	Yes
Interoperability	Yes	No	Yes	Yes
Functional Tests	No	Yes	Yes	No
User Experience / Field Tests	No	No	No	Yes

- **RF Conformance**: RF tests related to radio parameters, power levels, receiver sensitivity, spectrum, etc., these standards are defined by associations/alliances using in case already developed standards (i.e. 3GPP, ETSI)
- **RF Performance**: Over the Air Antenna Performance. Specific for each program.
- **Protocol conformance**: Protocol tests related to the stack used, to test all layers from MAC, Link Layer, Network
- **Interoperability:** These are tests necessary to verify devices of different brands interoperate with each other, or that applications are working properly within the device
- **Functional tests:** These are tests that all functions are operative, works properly and are safe
- **User Experience / Field Tests:** Tested evaluating from human point of view.

Do manufacturers required to be members of the associations ?

Some connectivity certifications require **to be a member** of association or alliance which is promoting it. And some of them require a **Certification Fee** to pay the costs of the association/alliance and a **Testing Fee** for the lab.

Alliance	Membership fee	Certification fee
CSA (Matter, Zigbee)	Associate $0/year Adopter $7,000/year Participant $20,000/year Promoter $105,000/year	Associate $2,500/rebrand product+$500/year Adopter $3,000/product+$2,500/rebrand product Participant $2,000/product+$1,500/rebrand product Promoter $2,000/product+$1,500/rebrand product
Thread	Implementer $7,500/year Contributor $15,000/year Sponsor $65,000/year + One-Time $35,000	New product: components $1250, end products $2500 Inheritance: contributor $1,000, implementer $1500
Bluetooth	Adopter $0/year Associate $10,350/year (annual revenue<100M) or $48,300/year (annual revenue>100M)	Adopter $11,040/product Associate $5.520/product
Wi-Fi	Implementer $6,000/year Contributor $25,000/year	Implementer: derivative $4,000/product Contributor: Flextrack $5,000/product, Quicktrack $7,500/product, derivative $600/product

What are main requirements to meet for Connectivity Certification

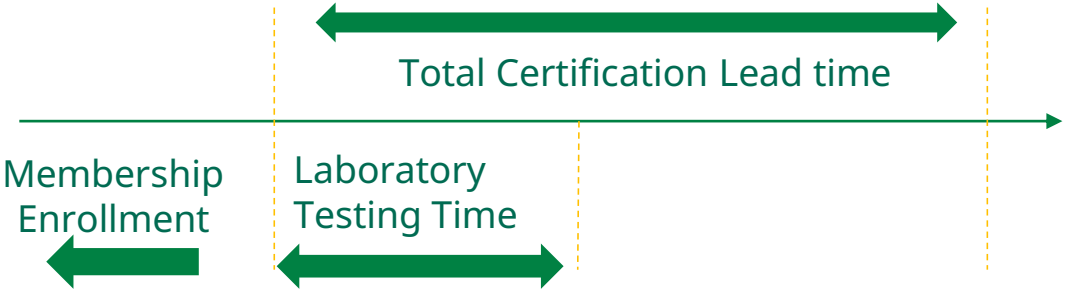
Key information for manufacturers interested in connectivity certifications.

Association/Alliance	Testing Average Costs	Laboratory Testing Time	Total Certification Lead time	Complexity
Bluetooth SIG	2K – 5K€	2 – 3 days	1-2 weeks	Mid
WiFi Alliance	8K – 18K	1 – 1.5 weeks	3-4 weeks	Mid
NFC Forum	3K – 8K	2 – 4 days	2-3 weeks	Mid
GCF/PTCRB (Mobile)	15K- 25K	2 – 3 weeks	4-6 weeks	High
LoRa	2.8K – 6K	1 week	2-3 weeks	Low
MATTER	2K – 4K	2-3 days	2-3 weeks	Low
ZigBee	2.5K – 5K	2-3 days	2-3 weeks	Low

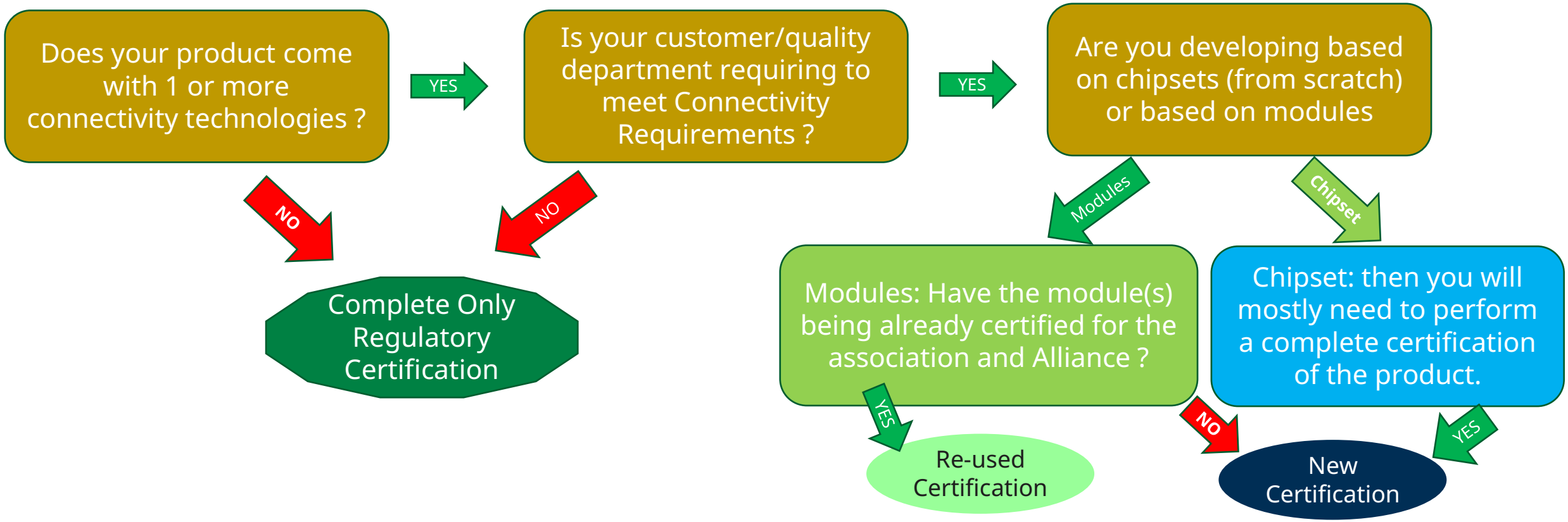
Price depends on product final configuration

1. Membership Fee (yearly)
2. Certification Fee (per project)
3. Testing Average Costs (per project)

Connectivity Certification Project Costs



What do you need to consider in the connectivity certification ?



1. Identify the module(s) and certification obtained: Ask reports and certificates (both) to supplier.
2. Ask supplier if they can support on certifications (if needed, some do not need).
3. Check validity of the reports and certificates of the module(s)
4. Do you make any change to the module(s): remove bands, change antennas, battery, charger, interface ?
5. Make a brief description of the products when using the connectivity modules. Data/Voice/Location
6. Are you member of the associations where the technology belongs ? It may take weeks to become member.
7. Contact a lab with accreditation and experience in these connectivity certifications.

Connectivity Certification - Benefits

- Improve products quality
- Products will reach more markets
- Products will interop with other brands
- More attractive for final users (Price valued)

Connectivity Future Trends

- Some technologies and associations will consolidate, while others will phase out.
- Global products must be designed to function universally.
- Satellite technologies will be adopted for data transmission.
- Technologies developed in Asia (particularly China) will be adopted globally (e.g., Sparklink).
- Tier 1 companies will establish key standards for interoperability.
- Each Tier 1 company will develop its own certification program based on user experience testing.
- Companies like Google, Apple, Amazon, Lenovo, Huawei, Mercedes, BMW, GM, Ford, AT&T, Vodafone, Bosch, and Signify will drive these programs.
- Global certification programs will become baseline requirements.

Thank you!