



# Frequently Asked Questions (FAQs) - IoT standards for Container Connectivity

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## Summary

All questions asked during the DCSA IoT webinars in June 2020 are addressed in this document.

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## DCSA GENERAL

### 1. Are you working on common standards for other transport modes (e.g. rail)?

DCSA develops standards mainly for container shipping, though the standards can be used in other transport modes. For example, the use of RFID for automatic container registration is applicable on land at terminals and depot.

### 2. What is UN/CEFACT?

<https://www.unece.org/cefact.html> The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) is a subsidiary, intergovernmental body of the United Nations Economic Commission for Europe (UNECE) which serves as a focal point within the United Nations Economic and Social Council for trade facilitation recommendations and electronic business standards. It has global membership and its members are experts from intergovernmental organizations, individual countries' authorities and also from the business community.

### 3. What is the role of COVID in accelerating the uptake of digital standards?

The COVID-19 pandemic has made clear there is a strong need for a more efficient (digital/standardised) logistics chain in all its aspects. DCSA initiatives, including eBL and IoT, fill that need, and we expect to see active adoption of our standards by the industry.

### 4. When are you planning to release the eBL standard?

Our first eBL publication is scheduled for December of 2020.

### 5. As a solution provider, can we propose that you evaluate our platform and services?

DCSA does not evaluate or endorse specific solution providers but lets our members do that independently.

## IoT STANDARD

1. **When deciding on a data construct for use with passive RFID, will you follow ISO or GS1 data constructs? If you use data constructs based on ISO rules, do you intend to apply for an AFI with AIM?**

This topic has not yet been studied or discussed in detail with our members and relevant SMEs (subject matter experts). DCSA is aware of existing work on this topic from ISO and GS1.

2. **One of the table specs refers to the info a dry container provides. I see temperature, door status, sensor, etc. Why is this required for dry containers?**

The use case in which a door opening (or the lack thereof) is identified (including, e.g. time and location) can be of interest when providing faster customer clearance and insurance claims.

3. **How can you avoid interference in the 2.4 GHz band between Bluetooth and other applications at terminals?**

**Complete question:** There is a lot of emphasis on Bluetooth in the standard. It seems you may be biased towards this technology for the radio interface, which might make sense when you adapt the protocol stack to enable mesh capabilities. However, the 2.4 GHz band is heavily used for various technology applications, especially at terminals. Even if you follow the standards, having a full triple E coming in loaded with Bluetooth devices and gateways could cause interference with a terminal's existing 2.4 GHz Wi-Fi networks and/or with other terminal technologies operating in this band (e.g. location services for automated terminals, OCR cameras in STS cranes, etc.), which would impact terminal operations. It is in everyone's interest to avoid this. How will you ensure it can be avoided? (e.g., are terminal operators and/or the equipment manufacturers for the terminals involved)?

It is correct that the unlicensed ISM bands can have an issue with interference since everyone can 'use' these frequencies.

However, when evaluating technologies that operate in these bands, DCSA has taken into consideration the modulation methods used to deal with interference. BL uses the FHSS technique that divides the frequency band into multiple channels (subcarriers) and distributes the signal over them by 'hopping' it from one subcarrier to another according to a pre-determined sequence. There are different frequency-hopping methods that can be adopted, and BL devices typically adopt Advanced/Adaptive Frequency Hopping (AFH). This technique is especially recommended for crowded networks since it is able to identify channels with fixed sources of interference and exclude them from the list of available channels.

4. **For "on land" use case 3 utilizing NFC, have you considered the practicality of this?**

**Complete question:** For "on land" use case 3 utilizing NFC, have you considered the practicality of this? NFC has a very short range, and you will potentially need to be located directly next to a container to be able to obtain the signal. Most inland depots (whether terminals, rail yards, depots,

etc.) have containers stacked in height (e.g. when in reefer racks at a terminal), and it might not be possible to get close enough to the tag to be able to read the NFC information. Hence, I foresee significant challenges in utilizing this in the real world.

The NFC interface is indeed not intended for long range applications. Its main application is as support for operational teams for device configuration when deploying or detaching the device from the container. It offers a quick, low cost method of close proximity container reading. For medium/long range readings, the other interfaces should be used.

**5. For “on land” use cases 1 & 2 you highlight the use of LoRaWAN and Bluetooth and rule out the use of more traditional cellular technologies such as 2G/GSM and LTE/LTE-NB. What’s the implication?**

**Complete question:** For “on land” use cases 1 & 2 you highlight the use of LoRaWAN and Bluetooth and rule out the use of more traditional cellular technologies such as 2G/GSM and LTE/LTE-NB, due to lack of continued coverage. For this to be feasible, I expect the outcome will be a recommendation that gateways are installed at terminals, warehouses and depots, and on trucks, trains, and barges, etc. This basically means any type of equipment that is either transporting or storing the containers while “on land” will have a gateway. However, such a gateway would need some form of connectivity, which you are not addressing in this release of the standard. However, unless you plan to use satellite, you will in most cases be faced with the same challenges for “external interfaces”, which have been used as the reasoning for not selecting any of the cellular technologies.

For on-land use cases DCSA rules out only the deployment of private cellular gateways due to regulation and licensing of the cellular spectrum. This does not mean that the existing cellular infrastructure owned by telecom operators should not be used, just that the cellular protocols are not part of the DCSA standard for on-land gateways.

**6. RFID - wouldn't it make sense to create a standardised database where additional info would be stored?**

**Complete question:** Regarding the additional info on type plate as reasoning to use RFID, wouldn't it make sense to create a standardised database where this would be stored? If the plan is to initially go with RFID, maybe this is something that is built in parallel as part of adding an RFID tag to the container, since that will be read to program the RFID.

We are defining all the required components to ensure interoperability. Hence, if this is deemed necessary for interoperability, we will create this database as part of the required components.

**7. Who will provide the IOT devices for the containers?**

This depends on the chosen IoT strategy, but very likely third-party solution providers will supply the IoT devices.

**8. What kind of data do you register with the sensors?**

That depends on the use cases, the capabilities of the deployed sensors, and the cargo and customer requirements. Temperature, humidity, shocks, open door detection are few examples of the data collected from different sensors.

**9. LoRaWAN - How do you address the need to switch ISM bands between regions?**

**Complete question:** A LoRaWAN IoT container device may communicate on one ISM band (e.g 868Mhz in EU) to the gateway in one region; however, it may need to use a different band in another region (e.g 915 in US). That means that the container devices will need the intelligence to switch based on location. In other words, a container leaving the EU for the US will need to have a second radio that communicates in the US band. How do you address this?

It is correct that LoRaWAN radios operate in the regionally regulated ISM band. Switching between frequencies can be handled manually or automatically by the devices.

**10. Are you planning to develop a standardised data exchange format in the cloud? That's where the interoperability needs to eventually happen in order for all members of the ecosystem to collaborate with each other.**

DCSA is looking at various topics of focus for the upcoming releases. Standardising the data exchange format is certainly on that list.

**11. Is an ISO standard being formulated as well?**

DCSA is not working on an ISO standard at present, nor is it on our current roadmap.

**12. Why have you chosen one specific unlicensed technology (i.e. LoRa) and not taken a more general approach with a reference to LPWAN?**

In order to guide the industry towards interoperability, and (e.g.) enabling containers from different owners to use the same supporting infrastructure for communication onboard a vessel, it was necessary to define a specific set of technologies. Different LPWAN technologies have been part of a long list that has been refined to the set of radio interfaces that you find in the standard today.

**13. In your study, did you address total cost of data collection or just focus on technologies?**

Costs are out of scope for DCSA. The total cost of data collection will be different across individual and more specific use cases. In our study, the proprietary nature of a technology was of interest to us, as we are trying to avoid lock-in to specific vendors to ensure open competition amongst manufacturers of devices and gateways.

**14. With regards to the devices/sensors, are you covering both those that are fixed to the container as well as the mobile devices?**

This standard is not focused on the devices specifically, only on the gateway radio interfaces. DCSA intends to focus on IoT devices in upcoming 2021 publications.

**15. There is a notable absence of 5G (including private / local 5G) in the standard and also no use of Wi-Fi. Are either likely to appear in later versions?**

Standards evolve over time; we expect to include 5G once it reaches global scale.

**16. Are you going to look at device qualities, perhaps defining the class of devices (mandatory features for compatibility) and the recommended manufacturers?**

Classifying devices is not on the roadmap of DCSA at this point. DCSA does not endorse any solution providers. The main objective for DCSA is to enable interoperability.

**17. Can you elaborate on the choice of NFC for handheld devices with a reach of less than 1 meter?**

The NFC interface is not intended for long range applications. Its main application is as a support for operational teams doing device configuration, or when deploying or detaching the device from the container. It offers a quick, low cost method of close proximity container reading. For medium/long range readings, the other interfaces should be used.

**18. Most phones only support NFC LF which has a reach of 4 cm.**

The NFC interface is not intended for long range applications. Its main application is as a support for operational teams doing device configuration, or when deploying or detaching the device from the container. It offers a quick, low cost method of close proximity container reading. For medium/long range readings, the other interfaces should be used.

**19. Can a container having 4 radio interfaces be traced all along the journey - on vessel, on land and through NFC and RFID?**

This release states that the gateways will have to support the 4 radio interfaces. The individual IoT devices can support only one.

**20. Are mesh networks like BLE or zigbee an option? And how will a mesh network handle dead spots caused by unconnected containers?**

DCSA believes that mesh networking will play a role in container IoT in the future, and therefore, the Bluetooth radio interface is part of the standard. BLE mesh networks could be one way to decrease the likelihood of connectivity dead spots, especially onboard the container vessel.

**21. Are all DCSA standards acceptable to the UN as well? What kind of agreement exists between you?**

The DCSA collaborates with and takes into account all relevant work items that have been published by all well-established standards organisations, including the UN.

**22. Why does the handheld use case not extend to use on the vessel?**

It is the belief of DCSA that a connected container onboard a vessel will utilize the onboard infrastructure, making the handheld/short range connection obsolete. Having said that, in a transition period, and for very specific use cases, it is conceivable that handheld devices can be useful onboard the vessel.

**23. One of the slides shows the handheld connected to a container stacked two high. Did you consider the range limit of the NFC technology that is being recommended for use?**

Yes, we did. NFC is to be used only for specific ultra short-range use cases.