**3GPP TSG SA WG 1 Meeting #99e S1-222208r1**

**Electronic Meeting, 22 August – 1 September 2022** *(revision of S1-22xxxx)*

**Source: KPN**

**pCR Title: Update of traffic scenario 6.1 with power scenario**

**Draft Spec: 3GPP TR 22.840**

**Agenda item: 7.3**

**Document for: Approval**

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*Abstract: <provide a short description of the content>*

**1. Introduction**

A traffic scenario on flower auction was accepted in SA1 #98-e. However, information on how power was provided was not agreed and deleted. KPN has now provided a discussion document / pCR on power scenarios for Ambient IoT. In that discussion document it is argued that although it is not important what type of power is used, there are service impacts on the power availability in Ambient IoT devices. Therefore a classification of power scenarios is proposed.

In the flower auction use case, a on demand power triggered scenario is assumed. This is now clarified in the assumptions of the traffic scenario.

**2. Reason for Change**

Without clarifying the power scenario that is assumed, it is not really clear how the flower auction use case works.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR 22.840v0.1.0.

\* \* \* First Change \* \* \* \*

## 6.1 Traffic scenario Flower Auction

### Description

In the Netherlands, there is extensive logistics industry for flowers and vegetables. A specific case are the auctions where flowers from all over the world are brought in by the growers, then auctioned and subsequently distributed to buyers all over the world.

Flowers are transported on four-wheel containers that can be rented and are that used throughout the logistic chain. These containers are now equipped with a RFID tag. It would be beneficial if Ambient IoT tags could be used. RFID tags are scanned when containers with flowers arrive or leave the auction; tracking and tracing with Ambient IoT could get regular reports from all containers anywhere at the auction.



Figure 6.1-1: Logistics at a flower auction

Shipments of flowers can be tracked and traced based on the containers they are on. This is of interest for growers, buyers and the auction. There is also logistics of empty containers, where also the company that owns the containers can benefit from Ambient IoT. Finally, the auction has an interest in managing its space. Companies that own or rent containers are charged for leaving containers on the auction grounds overnight.

Communication service availability is important. Tracking and tracing is mainly done to find out where things have gone wrong in the logistics, e.g., missing containers. If the communication from tags is not significantly more reliable than the logistics itself, then tracking and tracing does not provide a benefit.

Some numbers:

- There are multiple flower auctions in The Netherlands.

- The size of the flower auction location in Aalsmeer is 1 732 769 m2.

- 44 million flowers are auctioned per day

### Assumptions

We assume every four wheeled container is equipped with a tag in the form of an Ambient IoT device.



Figure 6.1-2: Container with flowers (Photo: Container Centralen)

Density of containers can be estimated based on the dimensions of the containers. A container is (lxwxh) 1350 mm x 565 mm x 1900m. Packing these containers closely together gives a density of 740 x 1770 = 1,3 million containers per km2.



Figure 6.1-3: Density of flower containers (Photo: Royal FloraHolland)

Ceiling in the flower auction is at 9 meters. We assume that base stations are attached to the ceiling. Number of base stations that is needed to cover the flower auction is dependent on the communication range and on the number of devices per base station. Here we assume a base station spacing of one base station for every 50 m x 50 m of ceiling. This gives a maximum range of approx. 35 meters from ceiling to container. The number of containers in that 50 m x 50 m area is approximately 3000.

The assumption is that the Ambient IoT devices in the tags are activated for communication on demand, where e.g. the flower auction or a flower grower can decide when power is provided in order to activate the Ambient IoT devices for communication. The Ambient IoT devices have no battery nor another way of harvesting power, therefore the devices are inactive (not sending, nor receiving data) when no power is provided to them. When activated the Ambient IoT devices respond by transmitting information, e.g. their identity numbers, to the network.

Editor’s Note: It is FFS if there are service aspects to avoid the overloading situation caused by Ambient IoT devices responding to the network.

Assumption is that an identity can be provided within 500 bits.

Assumption is that probability of errors in logistics handling (e.g., a container is left behind) is <1%. A communication service availability of 99,99% would imply that the chance that communication for tracking a container is approximately 2 orders of magnitude better than the logistics handling reliability.

### Potential Functional Requirements

None identified.

### Potential Key Performance Requirements

[PR 6.1-001] The 5G system shall be able to provide Ambient IoT service with the following KPIs:

Table 6.1-1: KPIs for Flower Auction scenario

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario | Communication Service Availability | MessageSize | Data rate per UE | Communication range | Device density | Devices per base station |  | Service area dimension |
| Container logistics in a flower auction  | [99,99%](note 1) | [500] bits(note 2) | [5] kbit/s(note 3 | [35] mIndoors | [< 1,3] Million/km2 (note 4) | <[3000] |  | [1 700 000] m2(note 5) |
| NOTE 1: Chance of communication service unavailability needs to be significantly lower than chance of errors in logistics handlingNOTE 2: Only an identifier for the tag is sent.NOTE 3: This value is calculated as the instant data rate for transmitting 500 bits within 100 ms time period. The need for data transmission is infrequent.NOTE 4: Based on closely packing containers.NOTE 5: Size of the flower auction location in Aalsmeer.  |