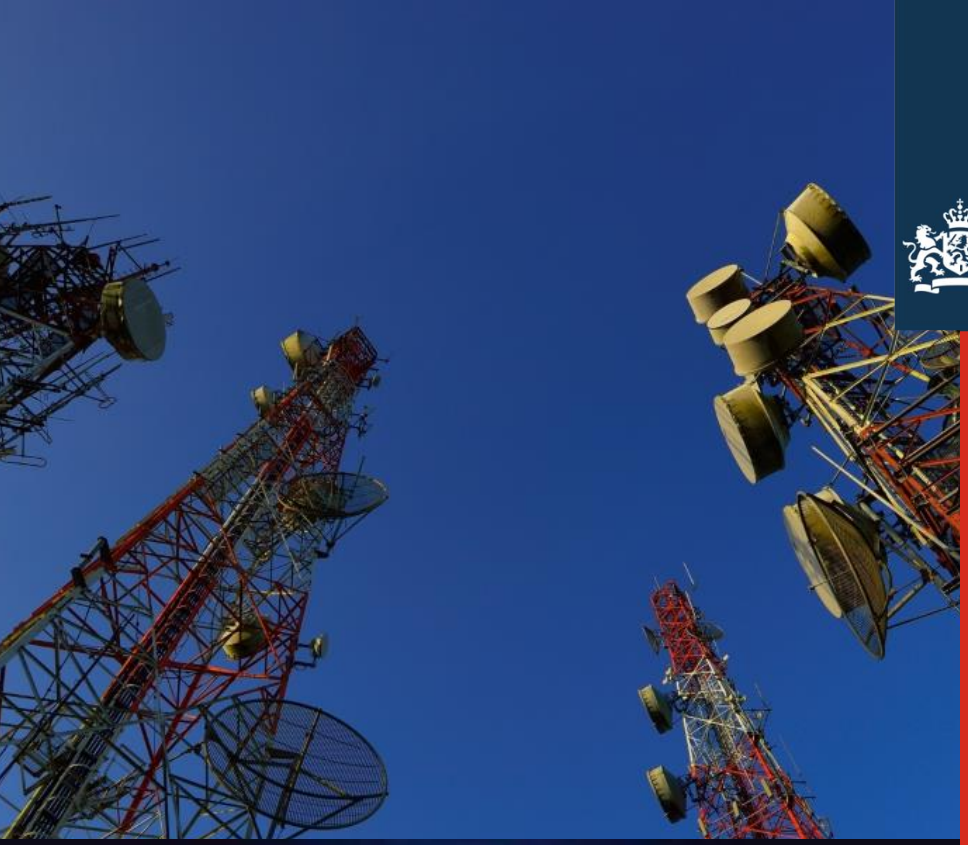

Radiocommunication Agency
Netherlands

Spectrum management for IoT deployment in the Netherlands

Aljo van Dijken

Senior Advisor

International

Spectrum Affairs

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based on:

The wireless Internet of Things: Spectrum utilization and monitoring

Dialogic (31 October 2016)

IoT general situation

- ✓ ***roll out IoT national network:***
  - * **KPN trough LoRa *(Long Range Low Power)***
    > using its mobile network

- ✓ ***5G(roningen):***
  > agriculture
  > e-health

  > high speed data

expectations & demands

- ✓ ***expectations:***
  - * **exploding demand device wise**
    - **> 8.6 and 52.1 million LPWA devices in the Netherlands in 2024**
- ✓ ***demands:***
  - **> agriculture**
  - **> environment**
  - **> smart buildings**

verticals

- ✓ ***general:***
  - ➢ **Smart Buildings: smoke alarms, white goods;**
  - ➢ **Agriculture and environment: land monitoring, livestock monitoring, forest monitoring;**
  - ➢ **Utility: gas and water meters;**
  - ➢ **Consumers: bicycles, pets;**
  - ➢ **Logistics: container tracking, refillable tanks and bottles;**
  - ➢ **Smart cities: street lighting, parking, waste management;**
  - ➢ **Industrial: indoor asset tracking, pipeline monitoring**

examples of LoRa verticals

- ✓ ***Schiphol:***
  - ➢ **luggage tracking;**
- ✓ ***National Railway:***
  - ➢ **monitoring rail conditions;**
- ✓ ***Rotterdam harbour:***
  - ➢ **water depth monitoring;**

challenges

- ✓ ***spectrum availability***
  - **> monitoring the trade flows of these devices will not be an easy task due to the diverse supply chains;**
- ✓ ***reliability:***
  - **> deployment of LPWA IoT in licensed spectrum is expected to be gradual and smooth;**
  - **> IoT in unlicensed spectrum below 1 GHz is much more complex (e.g. 863-870 MHz band);**

management challenges

- ✓ **the impact of short range IoT usage in unlicensed spectrum is expected to be limited:**

  a very high level of frequency re-use is possible for short range applications;

- ✓ **the regulatory frame-work may however not be adequate in the light of large-scale deployments of long-range technologies, such as for LPWA IoT. Two new scenarios of interference are of particular interest:**

management challenges

- a scenario where short range devices are close to a base station of a long range network, and cause interference that harms long range communication in the whole long range cell;

- a scenario where there is interference between different long range technologies in the same spectrum.

challenges

- ✓ ***Security:***
  - ❖ **critical usage (hacking);**
- ✓ ***Monitoring:***
  - ❖ ***trading flow the activities (amount of devices and parts mounted in the devices);***
  - ❖ ***geographical distribution;***
  - ❖ ***spectrum utilisation;***
  - ❖ ***cases of unwanted interference (etc)***

recommendations

- **instruct operators and user groups to educate (potential) users of IoT LPWA connectivity in unlicensed spectrum about the possible (future) risks regarding availability and reliability;**
- **encouraged operators to further densify their network;**
- ***not to allocate additional spectrum for LPWA IoT at the moment!***

link to the report:

http://www.iotjournaal.nl/wp-content/uploads/2017/02/dialogic_-_internet_of_things_spectrum_utilisation_and_monitoring_v2.3.pdf

Thank you very much
for
your attentions

questions?

personal info:

Aljo van Dijken
senior advisor international spectrum affairs
Radiocommunication Agency the Netherlands
aljo.vdijken@agentschaptelecom.nl
+316 2252 4080

PoBox 450
9700 AL Groningen,
The Netherlands