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Conference or Workshop Item

Title: Scheduling process for the M2M communications system in smart cities

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Development of scheduling process for the M2M communications system in Smart Cities

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Outlines

- Aims of the research
- A brief introduction to the M2M communications systems.
- The architecture and characteristics of the Weightless-N technology.
- The scheduling process and the data collision problem.
- A comparison between the standard algorithm and the developed algorithm.

Aims

- Develop a new scheduling algorithm to mitigate the data collision problem.
- Maintain the minimum power consumption with the best system reliability.

M2M communications system

- A machine-to-machine communications system (M2M) denotes the communications technologies between devices without the interaction of humans during the operation phase.
- Devices send and receive data to/from a database via a base station.
- Users can access this database and obtain the required data at any time.



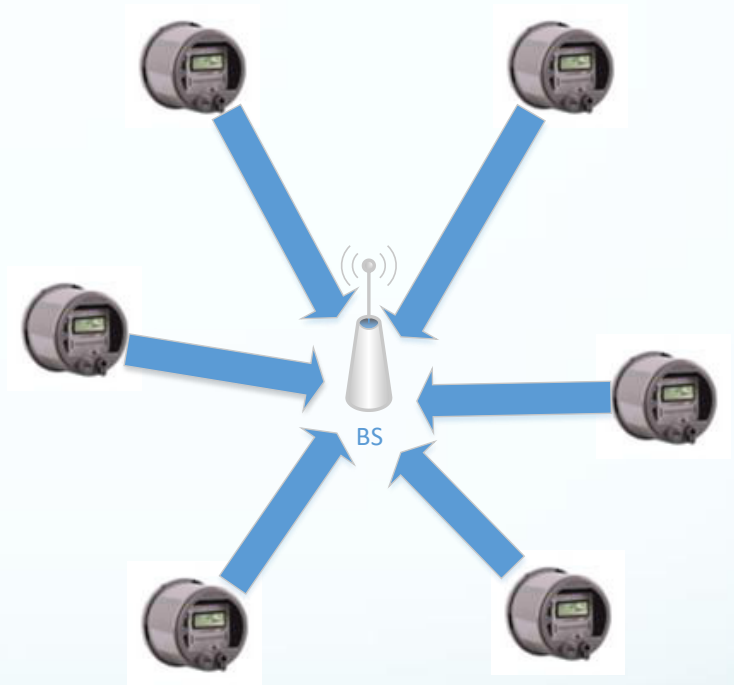
Applications in smart cities

- Smart meters (electricity, gas, water, etc.).
- Smart parking.
- Traffic monitoring.
- Health care systems.
- Agriculture applications.
- And many more.



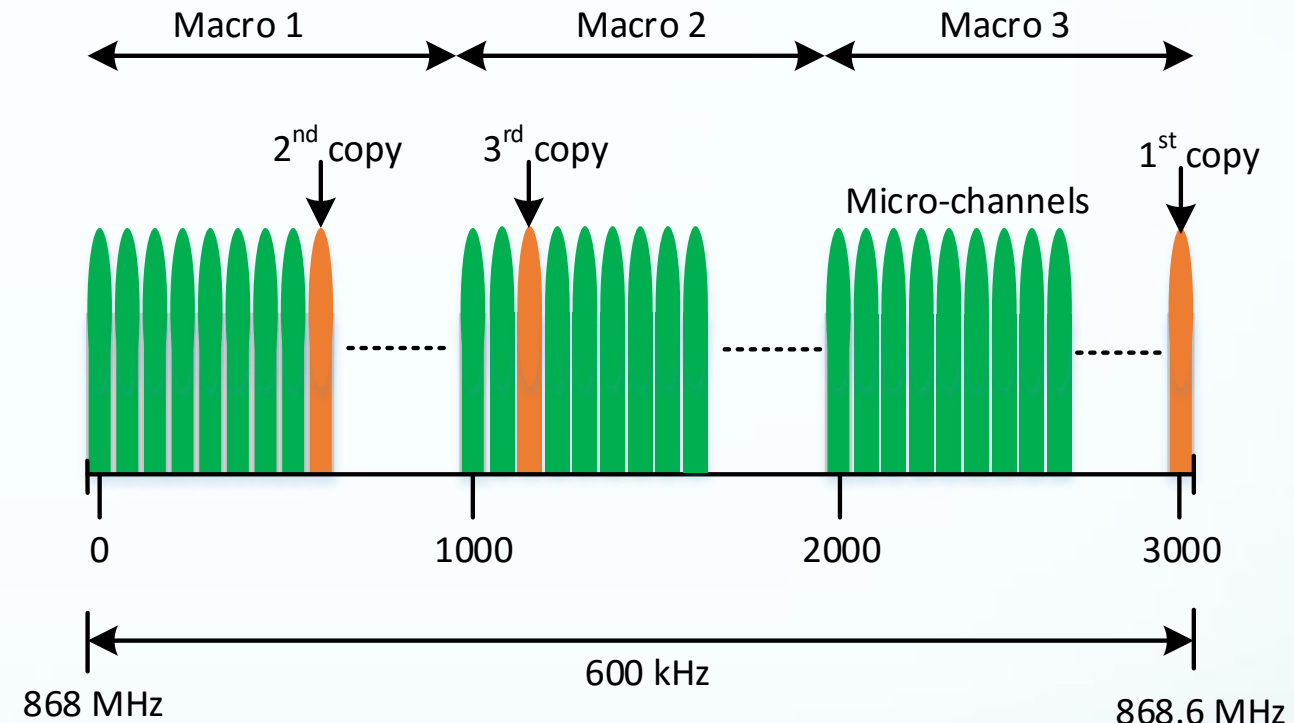
Weightless-N Architecture

- Star network topology with up to 10 km coverage.
- Unidirectional communication system. No acknowledgment and no synchronisation.
- Terminals send multi-copies of each message.
- The number of copies can be set from 3 to 8.



Working Approach

- BS Wideband = 600 kHz
- Ultra-narrowband = 200 Hz
- Number of channels = 3000
- Number of macro-channels = 3
- Number of micro-channels = 1000
- Each message copy will be sent on randomly selected macro-channel and micro-channel.



Collision problem

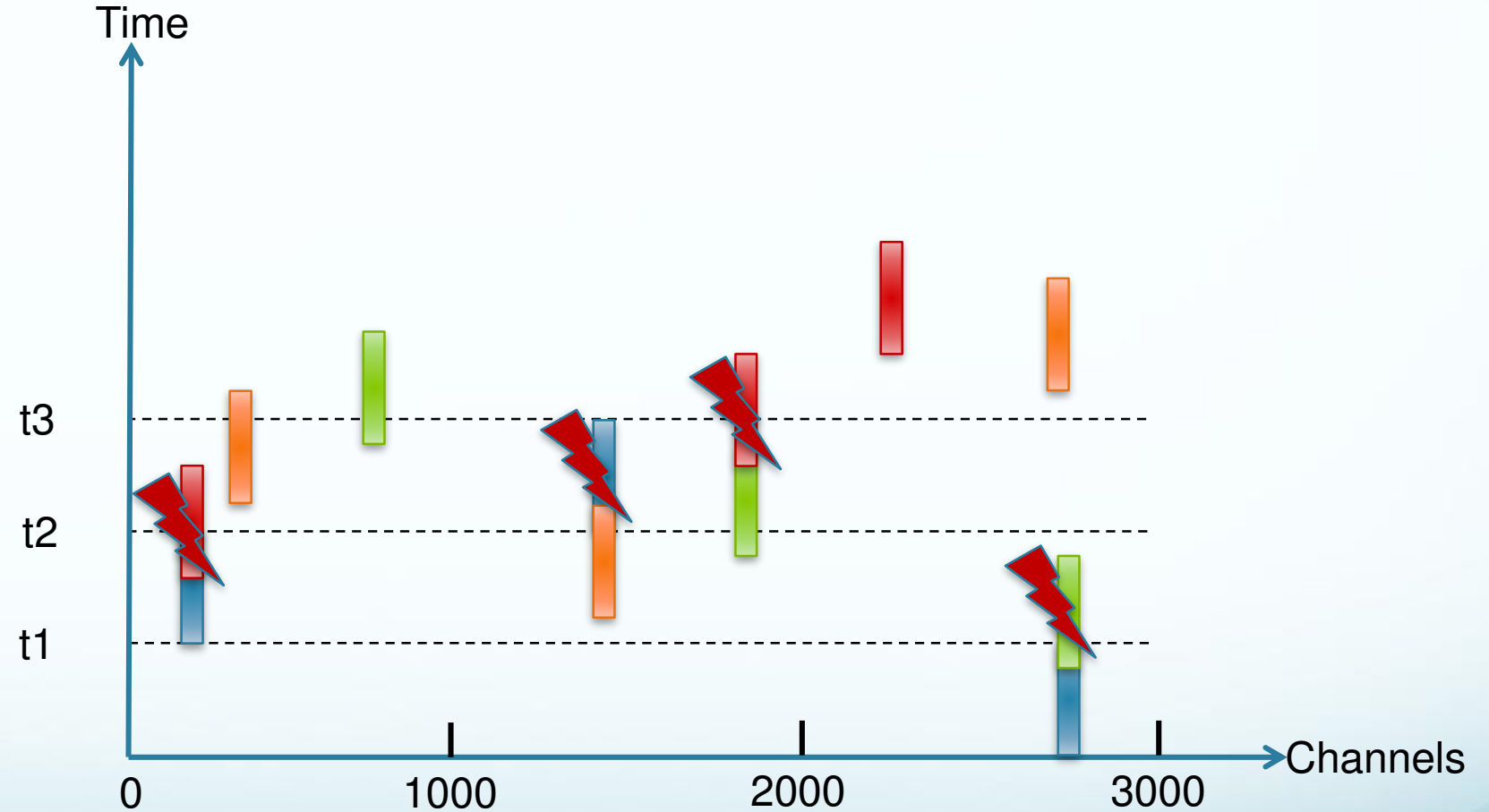
Each device will send 3 copies

➤ Device 1

➤ Device 2

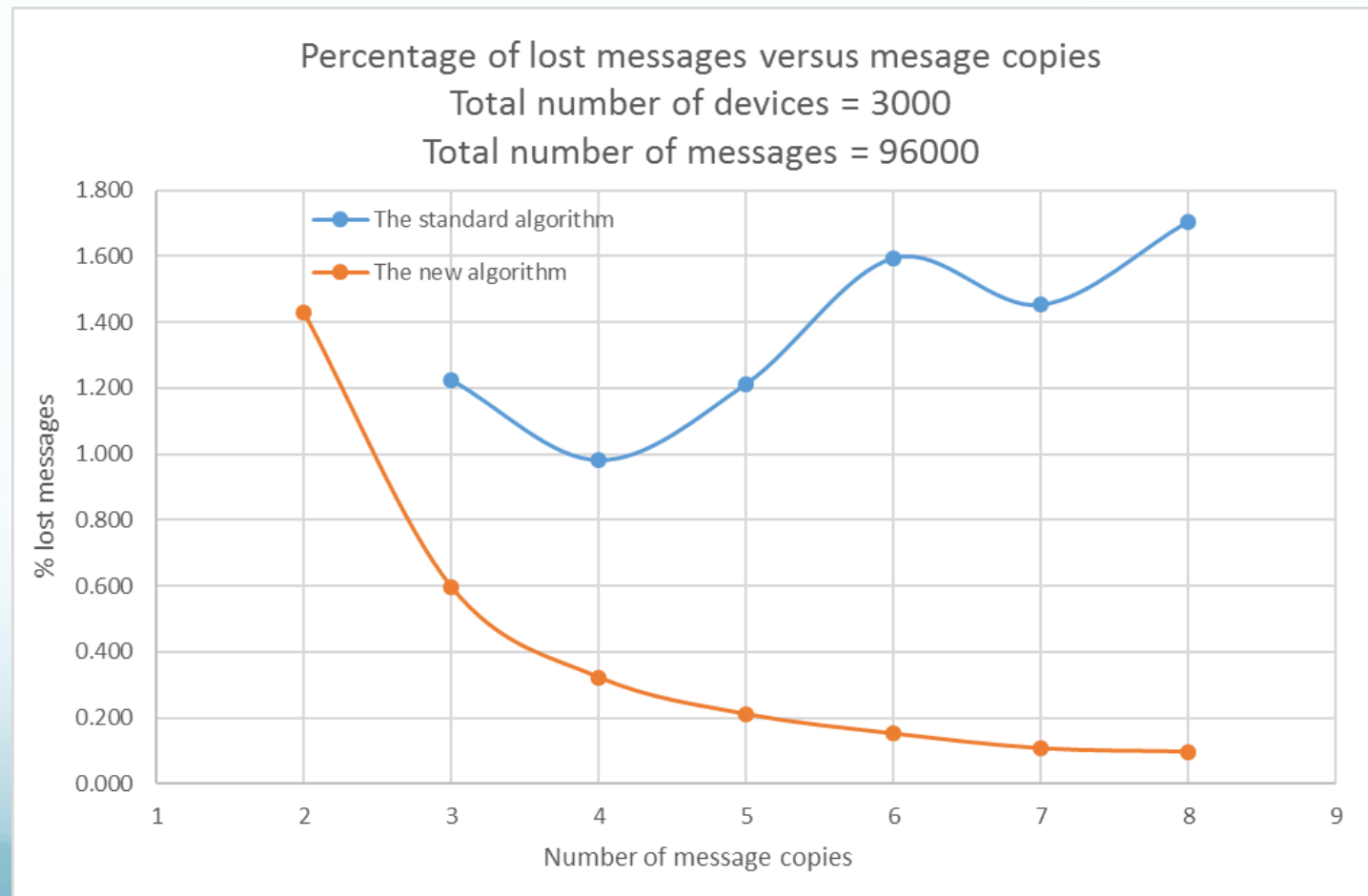
➤ Device 3

➤ Device 4



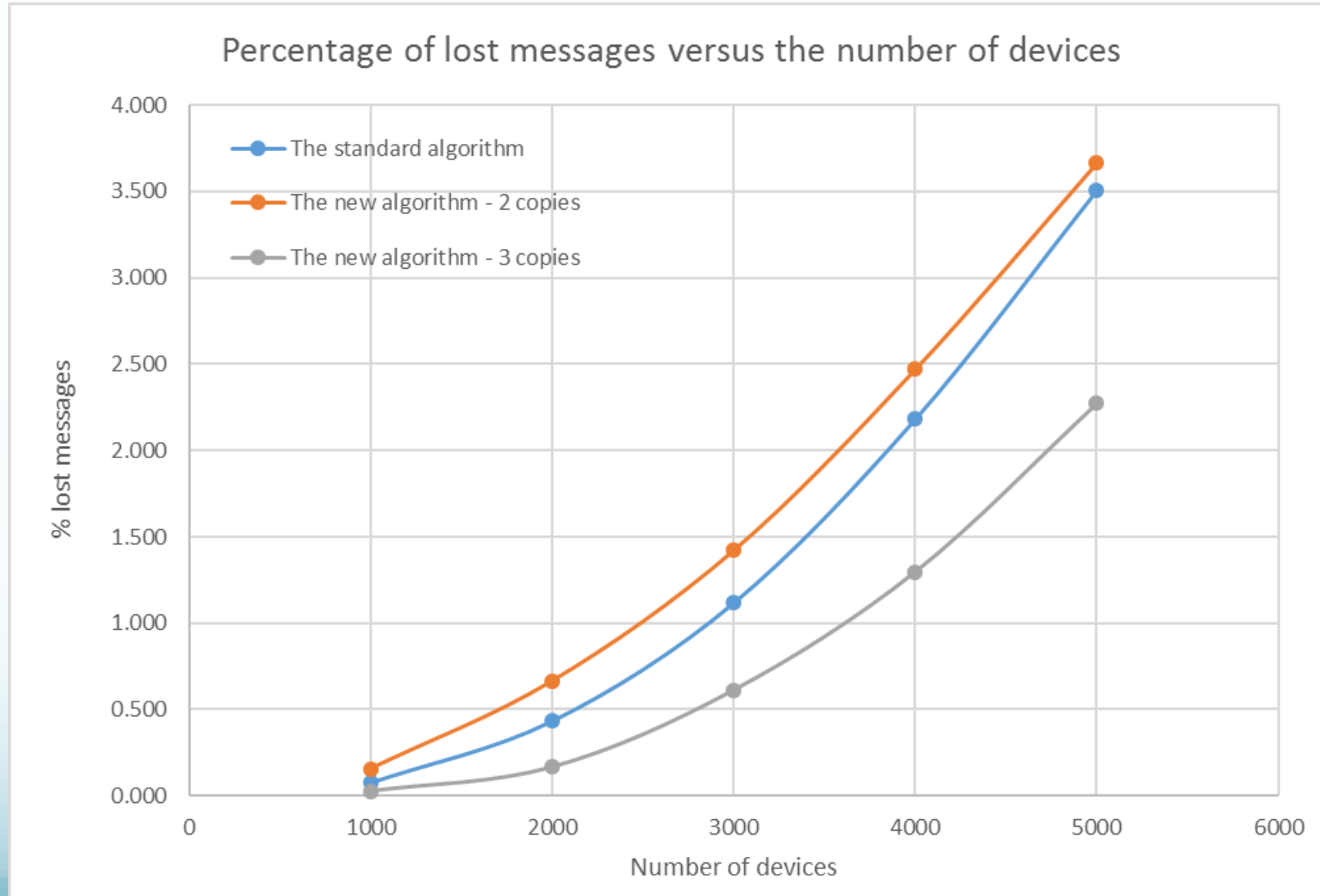
The new channel selection algorithm

- Provides a lower probability of collisions for different message copies.
- Two or more message copies can be used.



Lost messages versus number of devices

- The larger number of devices the better performance of the new algorithm.



Next step

- Modify the new algorithm to obtain a better performance with two message copies, which reduces the power consumption and increases the battery life span.
- Develop a new algorithm that can be applied in the US.

Thank you