

3GPP TSG RAN Rel-19 workshop

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Agenda Item: 5

Source: Haier W. M.

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Views on Rel-19 Ambient IoT

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Ambient IoT technology is important for verticals

- As a manufacturer of washing and care equipment and provider of washing and care solutions, Haier Washing Machine Company, not only produce washing machines, dryers, shoe washers, and care machines, but also provide users with professional clothing matching, storage services, and other solutions.
- Centered on creating the best user experience, based on intelligent technologies such as the Internet of Things, artificial intelligence, and 5G communication, Haier W. M. achieve digital intelligent management of clothing and provide users with intelligent solutions throughout the entire life cycle of "washing, caring, storing, matching, and purchasing".
- Digitalization capability is important to achieve efficient management for the end-to-end ecosystem. The vertical demands of timeliness, stability, low cost, productivity and value-added services have become critical.
- Ambient IoT would be a key enabler of E2E digitalization (from manufacturing to end consumer), which should provide:
 - ✓ Continuous coverage in desired area for verticals
 - ✓ Ultra-low cost and energy consumption devices, easy to be equipped (in small form-factor), and no need maintenance
 - ✓ Connectivity and others such as inventory, sensor, positioning etc.



Use Case 1: Smart Clothing Management

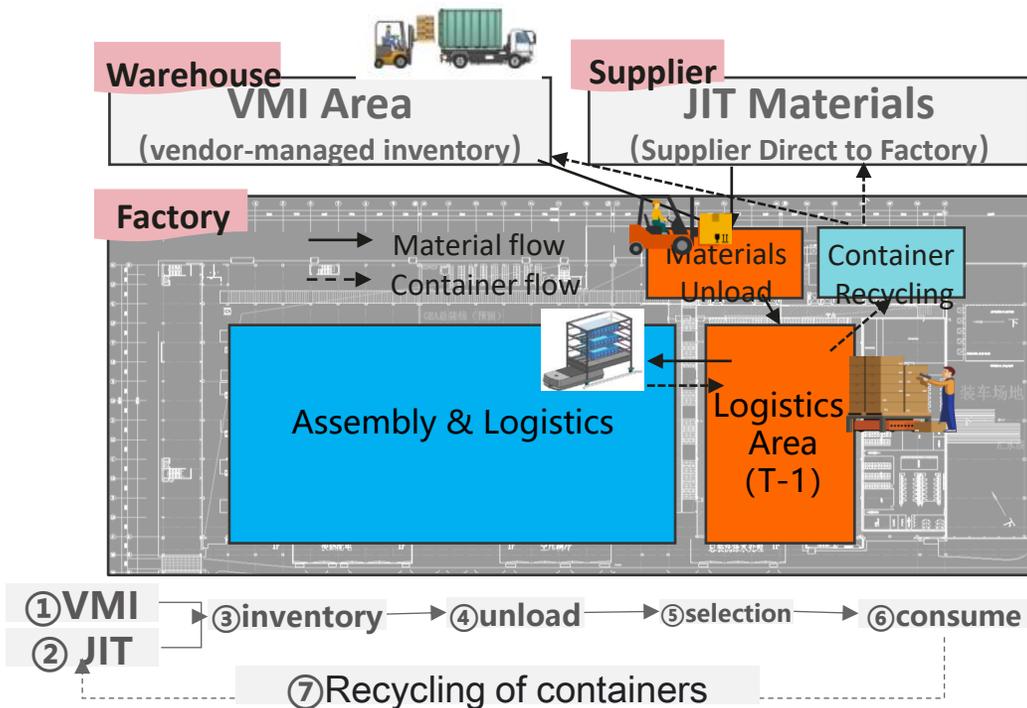
- Smart home appliances are upgraded to provide intelligent functions. Ambient IoT technology can be combined with those smart home appliance application to further improving user experience, and achieve customized services.
- Haier-IOC (Internet of Clothing) ecology is the whole process ecology around giving users digital management solution for clothing. In the era of smart home, clothes washing, laundry care and wear management become more attractive.
- **Challenges:**
 - End users may not have a scientific enough approach for daily care of their clothes, especially for clothes made of special fabrics. It is desirable to select proper laundry procedure to different clothes autonomously, as well as detergent and care cycles. In addition, using mismatched washing procedure can easily cause damage to clothing. When there are many clothes, stacking them in different wardrobes can be difficult to find. This scenarios could be happen in every family in the daily handling of clothing.



- **Expected solutions:**
 - Smart wash machines and clothing care machines can autonomously select appropriate laundry mode based on the information provided by labels attached on the clothes. Smart wardrobes can automatically detect the storage location of clothes and adjust temperature and humidity to achieve healthy storage.
 - Labels on clothes can provide connectivity to cloud platform, with taking labels information clothes can be visualized and displayed in virtual fitting room (e.g. cloud mirror). The users can easily experience in virtualized fitting, personalized clothing matching, clothing customization and other personalized functions at home or shopping store.
 - The digital recognition scheme for clothing needs to be able to accurately locate the position of the label, such as whether it is currently in the washing cylinder of the washing machine or in a certain wardrobe, and the recognition collection cost is low enough.

Use Case 2: Production material whole-process visible in the factory

- One factory produces 12,000 washing machines in more than 100 different types per day. Production materials turnover 1,450,000 times per day in the 9,000m² factory.
- **Challenges:** low efficiency of manual scanning, unknown location of stacked materials between manual scanning points, inability to detect if they are present in right place
- **Expected solutions:** the whole manufacture, materials management and logistics in the factory could be real-time visible and autonomously sensible. It is expected that enterprises can achieve material inventory and tracking at low cost and in desired efficiency.



Tens of millions connections can be expected:

1. The washing machine factory has an annual output of 3 million units where one unit contains more than 100 kinds of materials.
2. Number of factories in China (white goods): 60+

Summary

- Smart home appliance and increasing demand for personalizing user requirements and customizing home appliance requires efficient management of whole process including material parts supply, manufacturing, stocktaking, logistics, transportation and delivery.
- Ambient IoT would be a key enabler of efficient lifecycle management to improve both whole-process efficiency and consumer experience, considering the connection and data collection volume of massive clothing.
- It is recommended for 3GPP to have normative work (WI) on Ambient IoT in Rel-19 timely.