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A Review on User Grouping Based Two Phase Transmission Protocol for Achieving Ultra Reliability in Wireless Factory Automation

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ABSTRACT

This framework expects to create correspondence methods for making a change in perspective from customary human-type broadband communications to the rising machine -type Ultra reliable and low latency communication (URLLC) for factory automation. One central assignment for URLLC is to convey short messages from a controller to a group of actuators within less delay and with high reliability. Persuaded by the production line robotization setting in which errands are appointed to group of devices that work close to one another in this way can create clusters of device to device (D2D) networks, this proposes a novel two phase transmission protocol for accomplishing URLLC. Here grouping is done based on geographic location of users. In the first phase, within the latency availability, the multi-antenna base stations (BS) bring together all the messages of all devices within every group and send them to the respective groups. In the second phase, the devices that have decoded the messages effectively, in this called as leaders; help transfer the messages to other devices in the same group. The proposed technique prompts an ideal sparsity design in user action with at most one leader can receive the message within each group in the first phase, thus achieving reliability and providing D2D transmissions in the second phase.

KEYWORDS: *Ultra reliable and low latency communications (URLLC), Device to device (D2D), factory automation, sparsity design*

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INTRODUCTION

In a typical closed loop industrial control system, groups of sensors and actuators are maintained in a fixed area in a factory setup. Periodically or when triggered by external clocks, the sensors send their instructions to the central controller, which then takes decisions and sends commands to the actuators for taking action. According to the current technology, sensors and actuators are typically connected to the central controller through a wired connection in most factories. In the coming future, based on the fourth industrial revolution (known as Industry 4.0), the communication networks in the industrial setup are expected to change from wired to wireless for the purpose of increasing the flexibility in moving machines and also for reducing the infrastructure cost. As industrial automation schemes are highly sensitive to signal delays or distortions, such a change will impose challenging requirements in case of latency as well as reliability for the wireless technologies. In the proposed scheme based on geographic location of users, they are grouped. The central controller send measurements to each group and leaders in each group relay messages to other users in the group

The main objective is to address the challenges of wireless industrial automation by aiming on the downlink URLLC in one cell (factory) of a cellular system, where the multi antenna base station (BS) (the central controller) sends a small amount of information bits (command) to each user (actuator) within the latency requirement (1ms) and here grouping is based on geographic location. This method tries to answer the question, how to achieve the above goal with ultra-reliability in the case that all the users can decode their messages with a very high probability. This method proposes a dynamic leader selection based beamforming system based only on the instantaneous downlink channel state information (CSI) (without the need of CSI of the D2D networks) such that at the end of the first phase each group has at least one leader with high probability, here grouping is done based on geographic location.

OVERVIEW OF TWO PHASE TRANSMISSION PROTOCOL

Explains a novel D2D-based two-phase transmission protocol, in which the BS send its messages to the users or devices in the first phase, while in the second phase, the users that have already decoded the messages successfully (defined as the leaders of the groups) help relay the message information to the other users in the same groups who have not been able to receive their messages previously, here groups are differentiated based on geographical location.

PHASE 1

In the first phase, within the latency requirement, the multi-antenna base station (BS) combines the messages of all

devices within each group together and multicasts these messages to the respective groups; messages for distinguish groups are spatially multiplexed, here grouping of devices is done based on geographic location of devices.

PHASE 2

In the second phase, the devices that have decoded the messages successfully, herein called as the leaders, help relay the messages to all other devices in their groups. Under the proposed protocol, an innovative leader selection based beam forming method at the BS by utilizing sparse optimization technique. Thus all the devices in the group receives the message successfully.

CONCLUSION

We have presented a d2d-based two phase transmission protocol for ultra-reliable wireless communications for factory automation purpose. Explains about a novel two phase transmission protocol for achieving URLLC. Under this protocol, each group's messages are combined together and multicast to the leaders i.e., users that have already decoded the message from the BS in the first phase, while the leaders send the messages to the other users in the groups in the phase II. Due to the strong channels between the users in the same group D2D network is reliable, the challenge of our protocol is to select at least one leader for each group in the phase I through a proper beamforming design at the BS.

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