

scheduled IEEE 802.15.4 가

Performance Evaluation of scheduled IEEE 802.15.4 for Real-Time Wireless Network

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Key words : Wireless Industrial Network, IEEE 802.15.4, time division multiplexing access

1. (mobility) (mobile robot) AGVs(Automated Guided Vehicles), OHTs(Over head Hoist Transfers) (mobile devices) 가 [1].

DeviceNet, Profibus-DP, Ethernet [2]

Radio-Frequency(RF) Slots) modem 가

가 IEEE 802.11b [3]. IEEE 802.11b TCP/IP

ZigBee IEEE 802.15.4 WPAN(Wireless Personal Area Network) 가 [4]. IEEE 802.15.4 (Medium Access Control) CSMA/CA(Carrier Sensing Multiple Access with Collision Avoidance) 가

IEEE 802.15.4

IEEE 802.15.4 (time slot)

scheduled IEEE 802.15.4 scheduled IEEE 802.15.4

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2. Overview of IEEE 802.15.4

IEEE 802.15.4 가 , IEEE(Institute of Electrical and Electronics Engineering) 2003 LR-WPAN(Low-Rate Wireless Personal Area Network) . IEEE 802.15 task group

WPAN IEEE 802.15.1 BlueTooth IEEE 802.15.4 ZigBee IEEE 802.11 가

IEEE 802.15.4 2.4GHZ ISM (The Industrial, Scientific and Medical) 가 250kbps 30m

Fig. 1 IEEE 802.15.4 CAP(Contention Access Period) 가 CSMA/CA , CFP(Contention Free Period) GTSs(Guaranteed Time Slots) CAP CSMA/CA(Carrier Sense Multiple Access with Collision Avoidance) CSMA/CA 가, (1)

$$InitialbackoffPeriod + CCA = (2^{macMinBE} - 1) * aUnitBackoffPeriod + CCA \quad (1)$$

where: macMinBE = 0,1,...,3

CFP CAP GTS 가

3. Scheduled IEEE 802.15.4

IEEE 802.15.4 CSMA/CA 가 가 (Non-Time Deterministic) IEEE 802.15.4

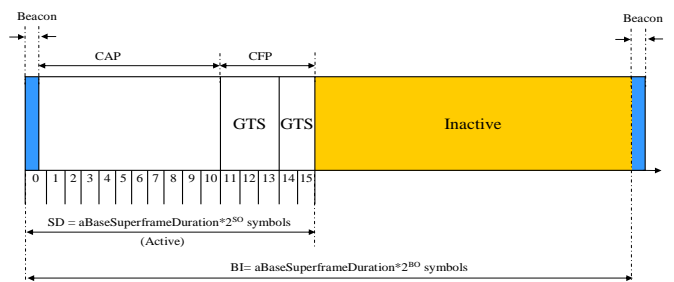
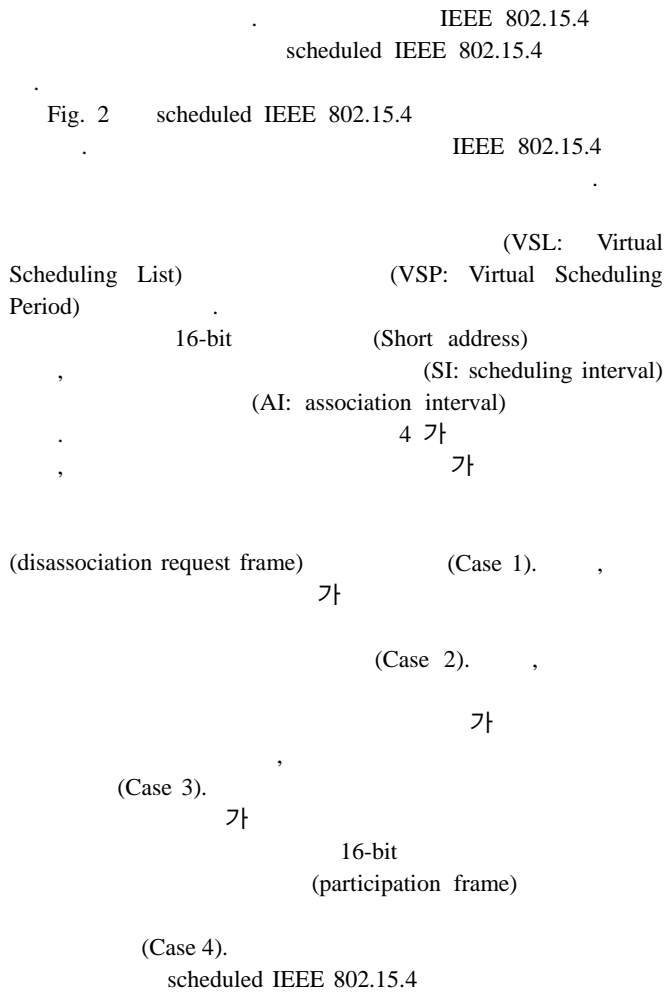


Fig. 1. Structure of IEEE 802.15.4 superframe.



4. Performance Evaluation of scheduled IEEE 802.15.4

가 (Jennic) JN5121 MCU 7

1
6
JN5121 MCU IEEE 802.15.4
MAC 2.6, 1.6
(library) XP
(CodeBlock)
IEEE 802.15.4 scheduled
IEEE 802.15.4 가
30, 25, 20, 15, 10msec 22-byte
. IEEE 802.15.4
14byte 가

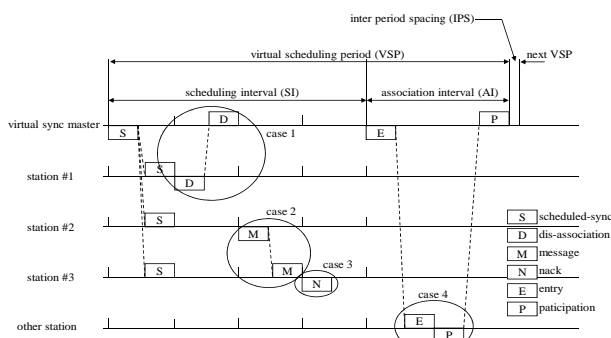


Fig. 2. Schematic diagram of scheduled IEEE 802.15.4.

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Fig. 3 IEEE 802.15.4
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5. Summary and Conclusions
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2. K. H. Lee, S. H. Kim, Y. K. Kwak, "Mobility improvement of an Internet-based robot system using the position prediction simulator," International Journal of Precision Engineering and Manufacturing, Vol.6, No.3, PP.29-36, 2005
3. Willig. A, Matheus. K, Wolisz. A, "Wireless technology in industrial networks," Proceedings of the IEEE, Vol. 93, No. 6, pp. 1130-1151, 2005.
4. T. Ciardlello, "Wireless communication for industrial control and monitoring," Computing & Control Engineering Journal, Vol. 16, Issue 2, pp. 12-13, 2005.

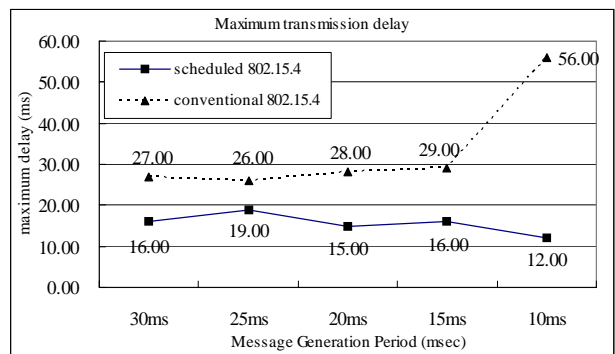


Fig. 3. Maximum transmission delay of conventional and scheduled IEEE 802.15.4.