performance, implying that both the RU-info airtime and the signaling success probability are the affecting factors of the performance in this OBSS load condition. The two-channel mode balances the factors in this condition. When the OBSS traffic generation rate increases to 10 and 50 Mbps, the signaling success probability becomes a more dominant factor and the four-channel mode significantly deteriorates in performance.

The cumulative distribution functions (CDFs) of the per-station traffic delivery ratio are shown in Fig. 16 for the OBSS traffic generation rates of 1, 10, and 50 Mbps. The CDFs show that the opportunistic adaptation outperforms all of the fixed modes for all stations. This finding implies that the opportunistic adaptation achieves a performance gain by efficiently utilizing available bandwidth patterns.

VII. CONCLUSION

In this paper, we illustrated the wideband operation of conventional IEEE 802.11 with the contiguous channel bonding rule and described how the new puncturing mechanism of IEEE 802.11ax facilitates higher bandwidth utilization. We demonstrated the challenges to wider bandwidth as a result of the fixed two-channel signaling structure of RU-info under the design of IEEE 802.11ax. In this regard, we investigated the tradeoff between signaling overhead and transmission bandwidth. After that, we demonstrated the solutions and benefits to balancing the tradeoff in either an opportunistic or a statistical manner to solve these challenges. Through comprehensive simulations, we showed the performance gains of the proposed solutions over fixed RU-info signaling structures in various network environments.

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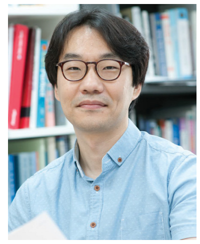

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