FFR Based Interference Coordination Scheme in the Next Generation WLAN

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Outline

- Introduction
- Method
- Performance Evaluation
- Conclusion

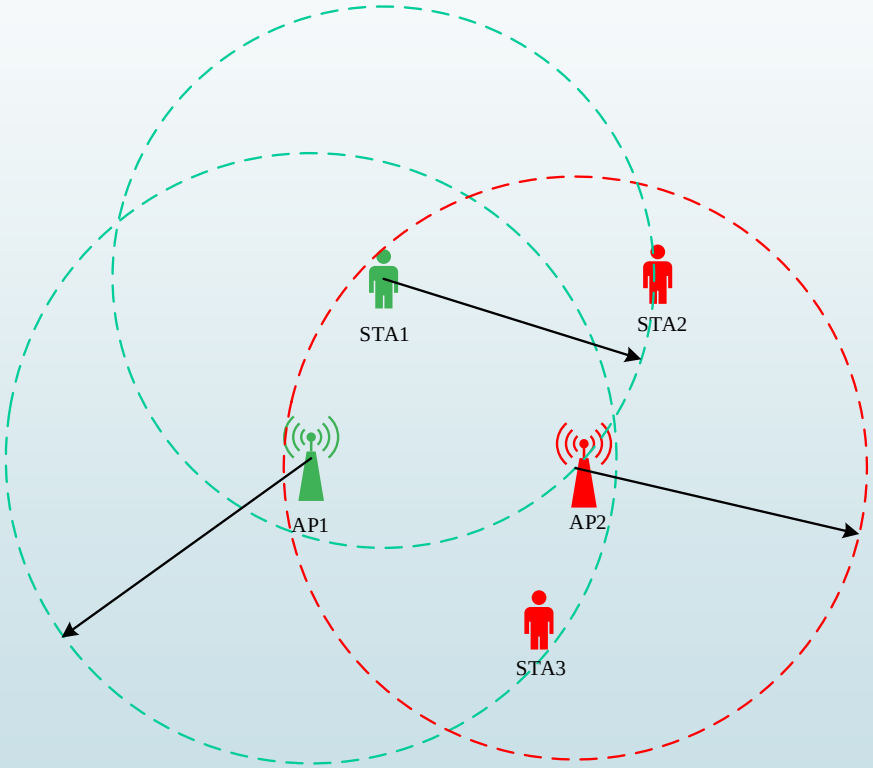
Introduction

Background

Related Works

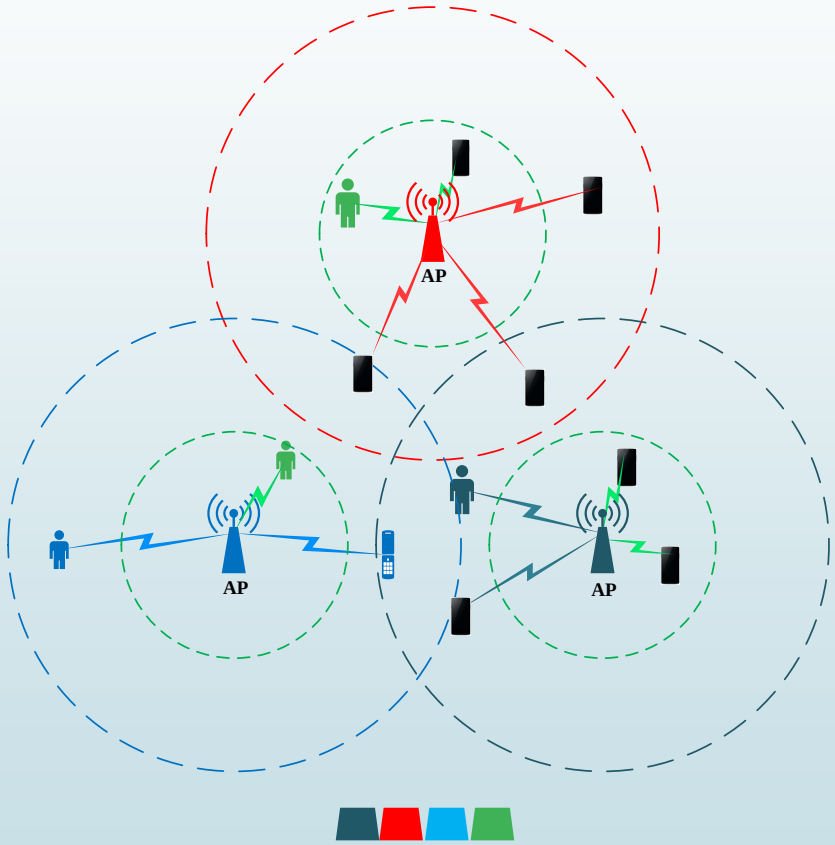
Background

- In traditional WiFi networks, OBSS problem leads to low overall throughput due to interference.
- 802.11ax intends to enhance interference management function in the dense deployment.



Related Works

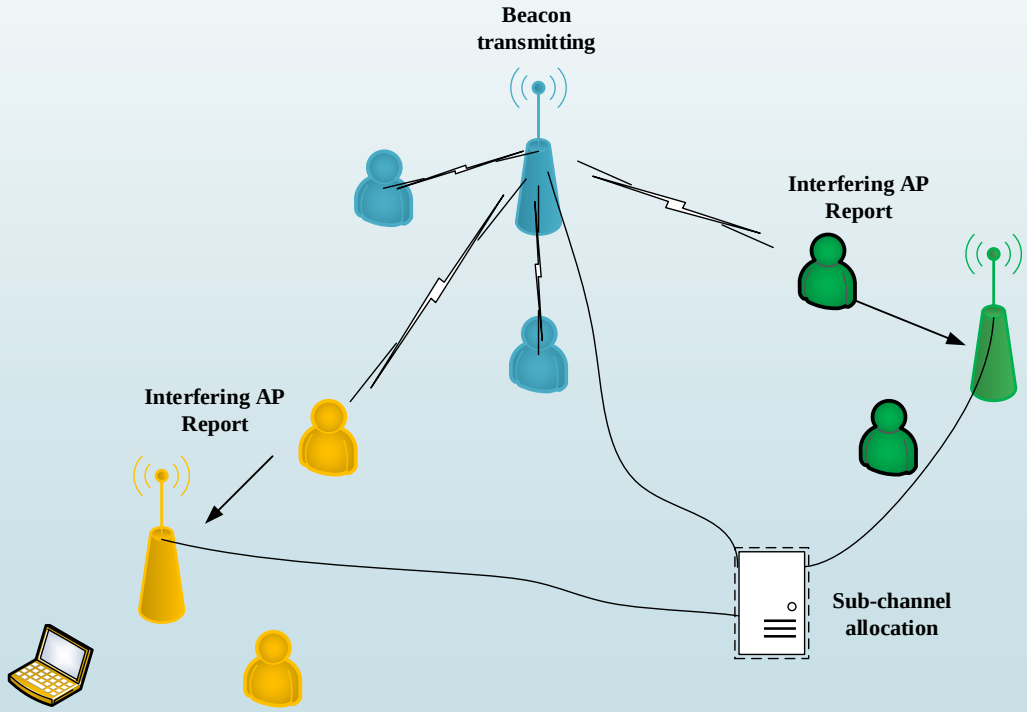
- OFDMA and MU-MIMO can reduce the contention overhead.
- The DSC technique reduces the number of the exposed nodes.
- FFR could improve the throughput of users in OFDMA celluar network.



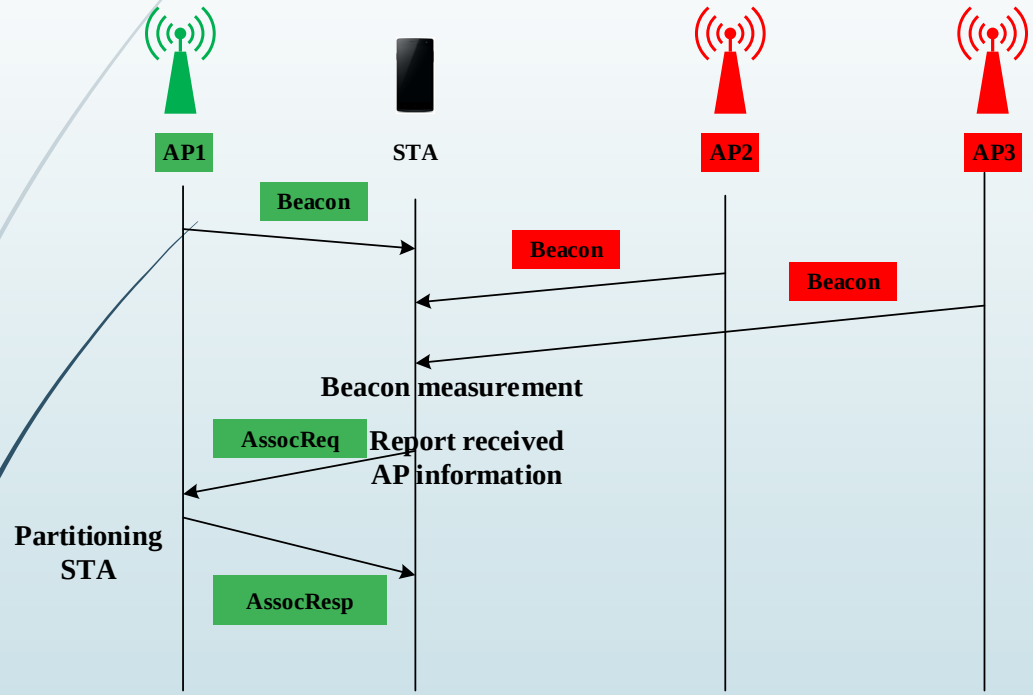
Method

STA Identification Approach

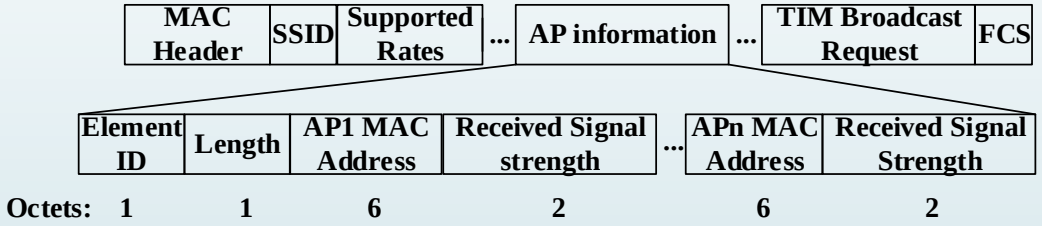
Sub-channel Allocation Method



STA Identification Approach



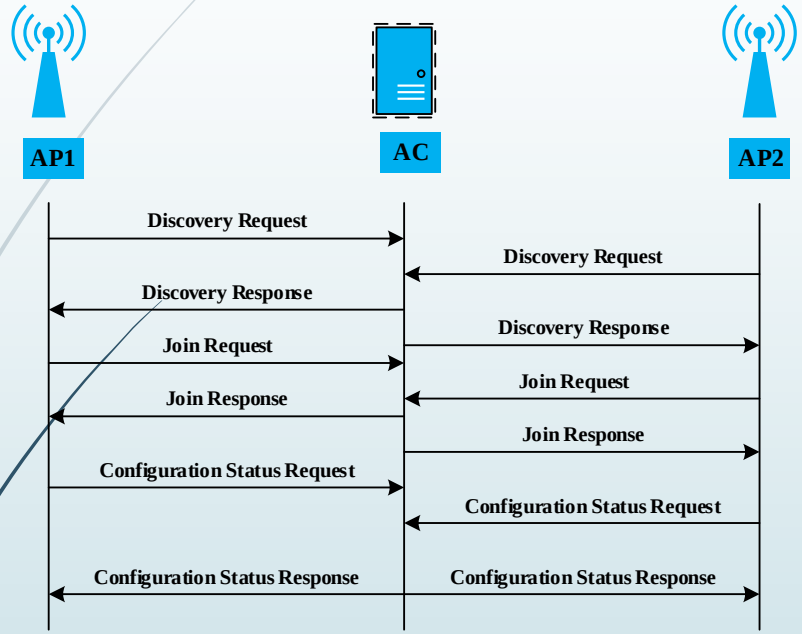
(a) Procedure for identifying STA



(b) Structure of AP information in association request

The STA would be an OBSS STA, if $\frac{S_1}{S_2 + S_3} < SINR_{th}$.

Sub-channel Allocation Method



(a) Procedure for sub-channel allocation

IP Header	UDP Header	CAPWAP Header	Control Header	Message Element(s)

(b) Control frame in CAPWAP

Element ID	Length	Primary Channel No.	Start Channel No.	End Channel No.	Element ID	Length	Radio MAC address
Octets: 2	2	2	2	2	2	2	6

(a) Element of Frequency configuration and Radio MAC address in Join Request

Element ID	Length	AP1 Radio MAC Address	...	APn Radio MAC Address
Octets: 2	2	6		6

(b) Interfering AP information in Configuration Status Request

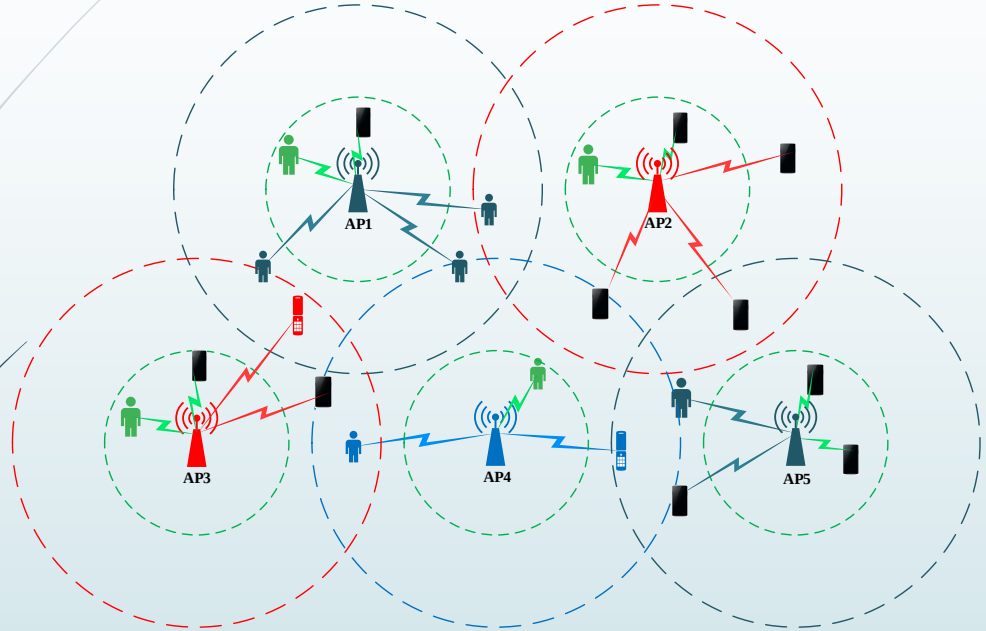
Element ID	Length	BSS-center Start Channel No.	BSS-center End Channel No.	BSS-edge Start Channel No.	BSS-edge End Channel No.
Octets: 2	2	2	2	2	2

(c) Sub-channel Configuration in Configuration Status Response

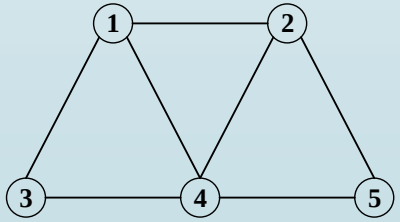
Element ID	Length	Number of BSS-edge neighboring APs	MAC Address 1	...	MAC Address N	Number of BSS-center neighboring APs	MAC Address 1	...	MAC Address M
Octets: 2	2	1	6		6	1	6		6

(d) Neighboring AP information in Configuration Status Response

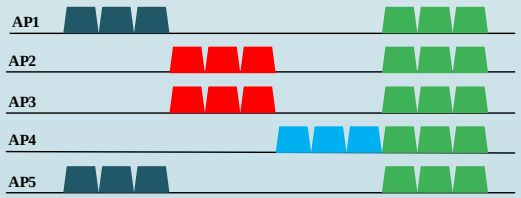
Sub-channel Allocation Method



(a) A dense WLAN of 5 BSSs



(b) Interference graph



(c) Sub-channels allocated to each AP

- AP4 with the highest degree is colored first, then AP1 and AP2.
- AP3 and AP5 can reuse the colors of AP2 and AP1.
- All the sub-channels are divided into four sets. one set is allocated to BSS-center STAs, the others is used by the BSS-edge STAs.

Performance Evaluation

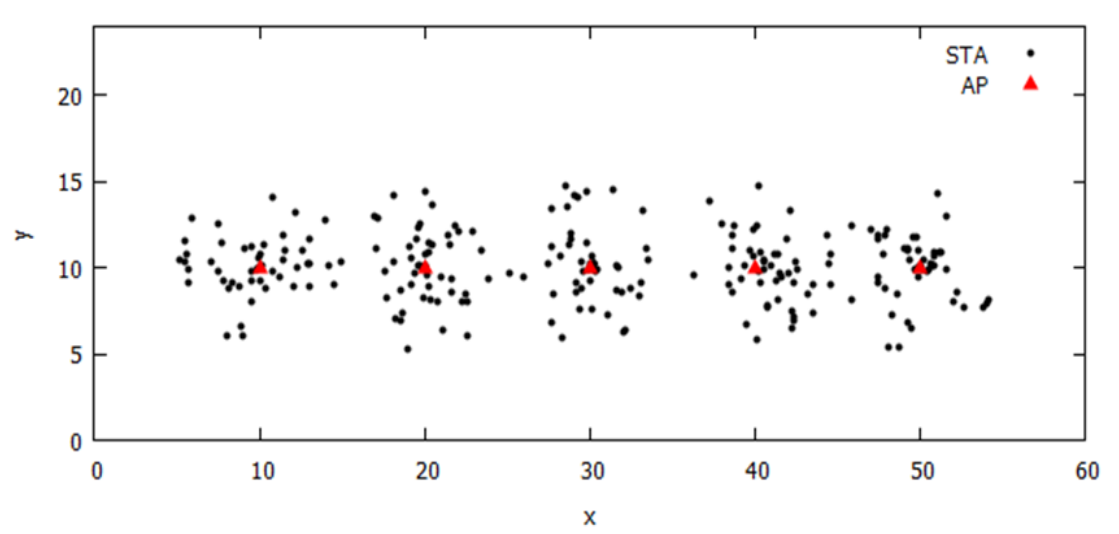
Simulator Setup

Enhancement of BSS Throughput

Fairness in Throughput of STA

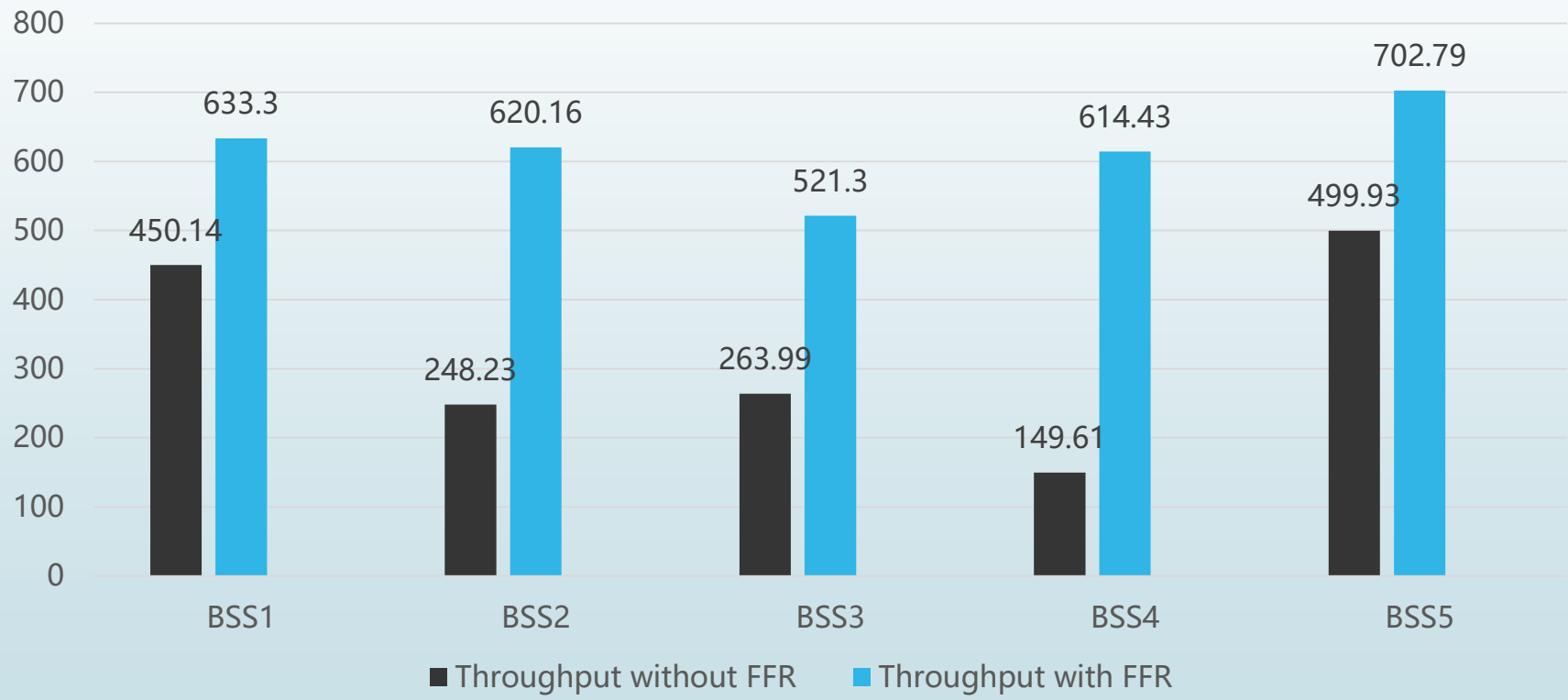
Increase in SINR at Receiving STA

Simulation Setup

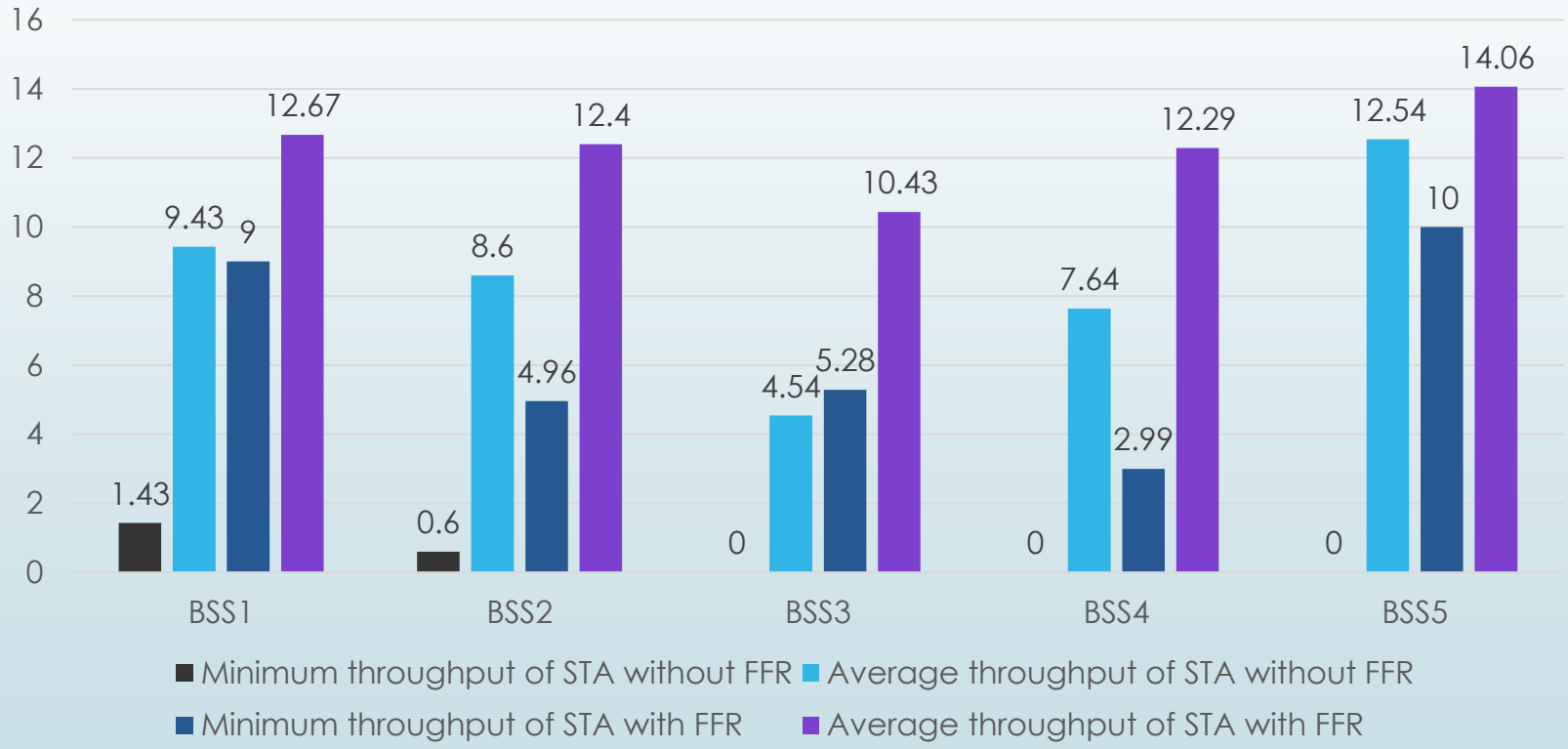


Parameters	Value
Frequency	5GHz
Total Bandwidth	480MHz
Bandwidth per sub-channel	20MHz
TX Power (AP/STA)	20/15 dBm
CCA threshold	-62dBm
OBSS_PD threshold	-30dBm
MSDU length	1200Bytes
Beacon interval	102.4ms
Traffic	Downlink full buffer
Max A-MSDU duration	4.08ms

Enhancement of BSS Throughput

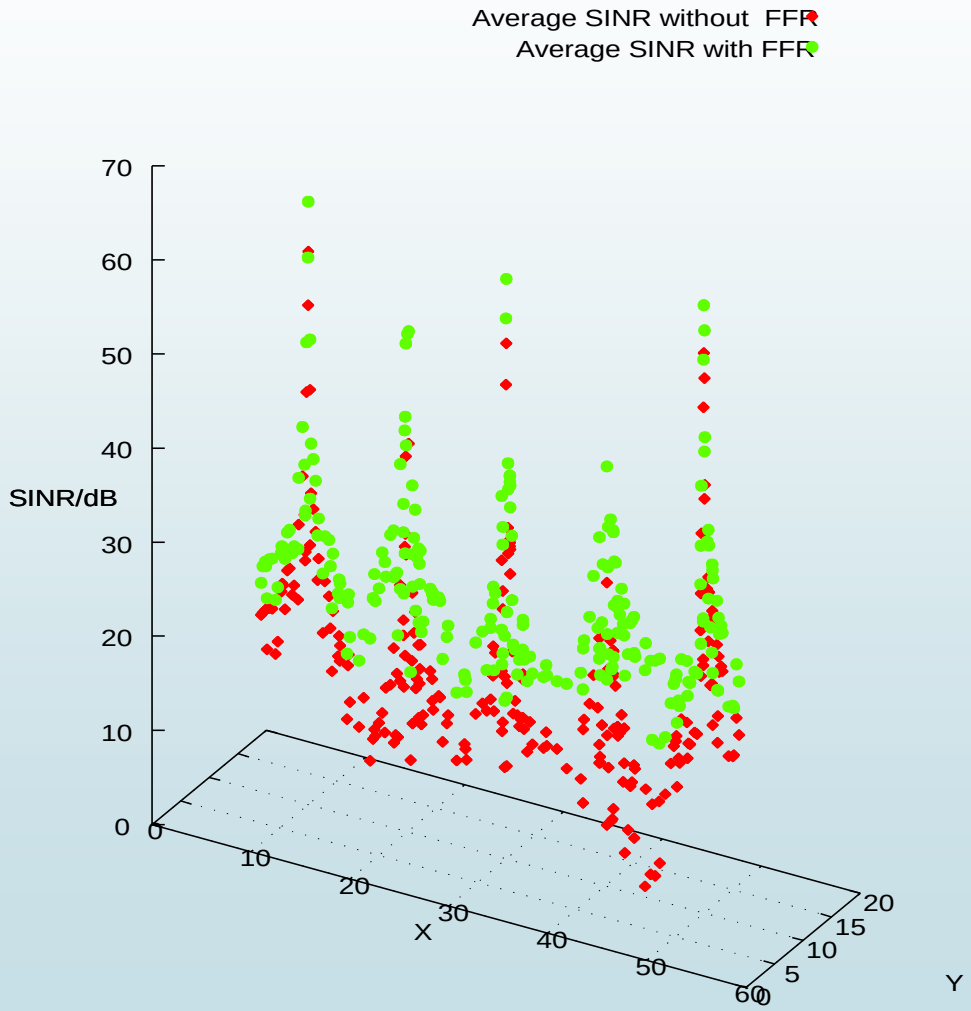


Fairness in Throughput of STA

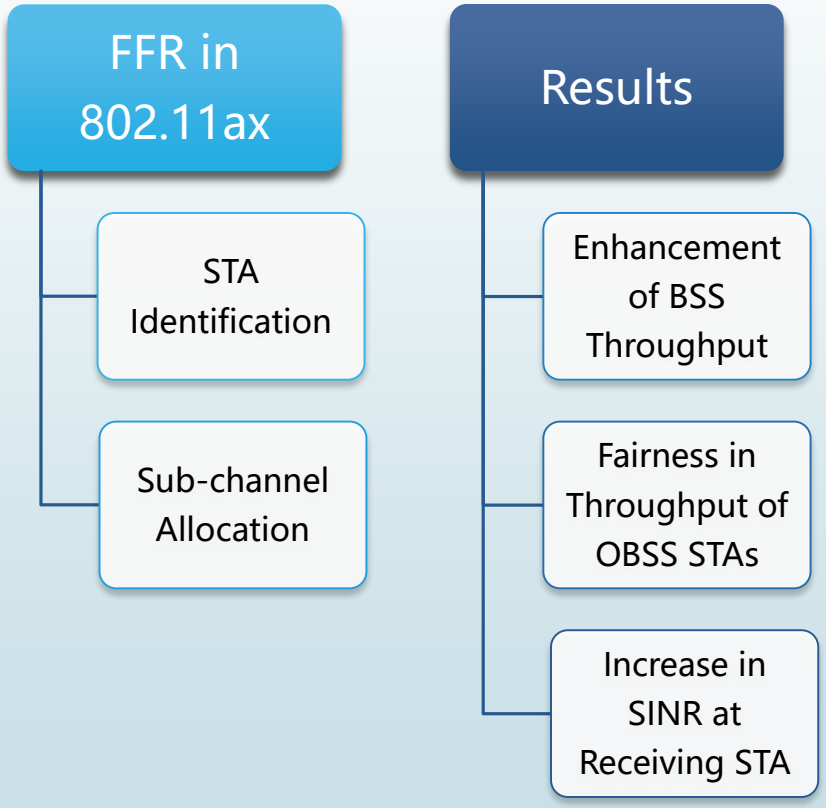


Increase in SINR at Receiving STA

- The received SINR of BSS-edge users is up to 20dB.
- The average SINR grows by 10-15dB.
- The received SINR of BSS-center users also arise.



Conclusion


FFR in 802.11ax
STA Identification
Sub-channel Allocation
Results
Enhancement of BSS Throughput
Fairness in Throughput of OBSS STAs
Increase in SINR at Receiving STA

Question-inviting.

Thank you!