

多元アクセス方式の研究

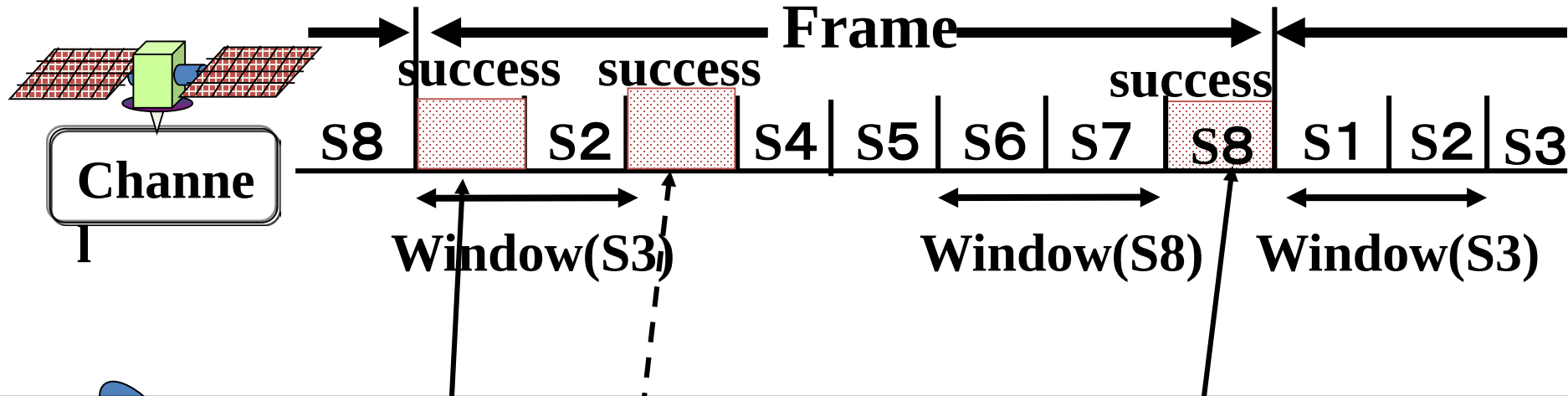
Research on Multiple Access Schemes

Fixed Assignment Based Window Access

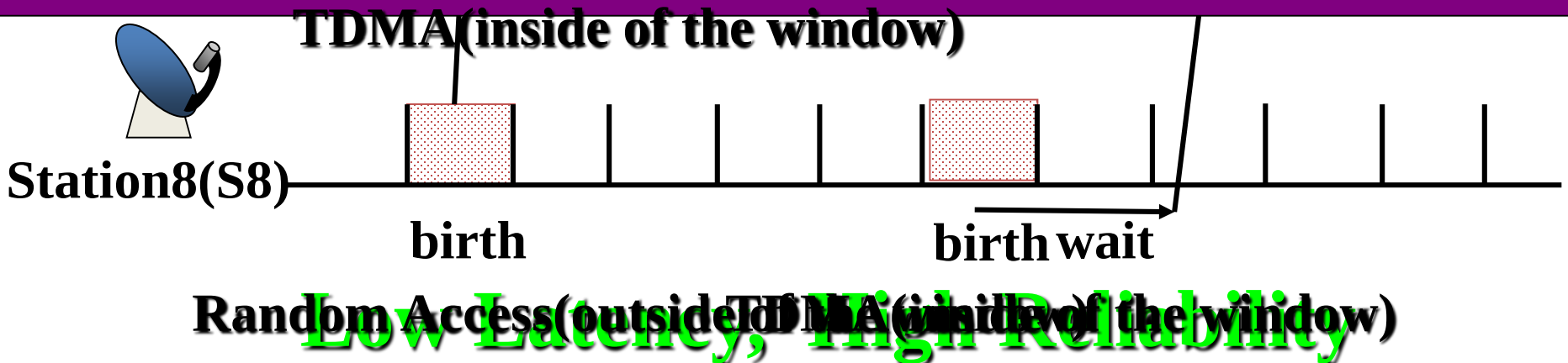
Power level Division Multiple Access

Orthogonal Frequency Division Duplex

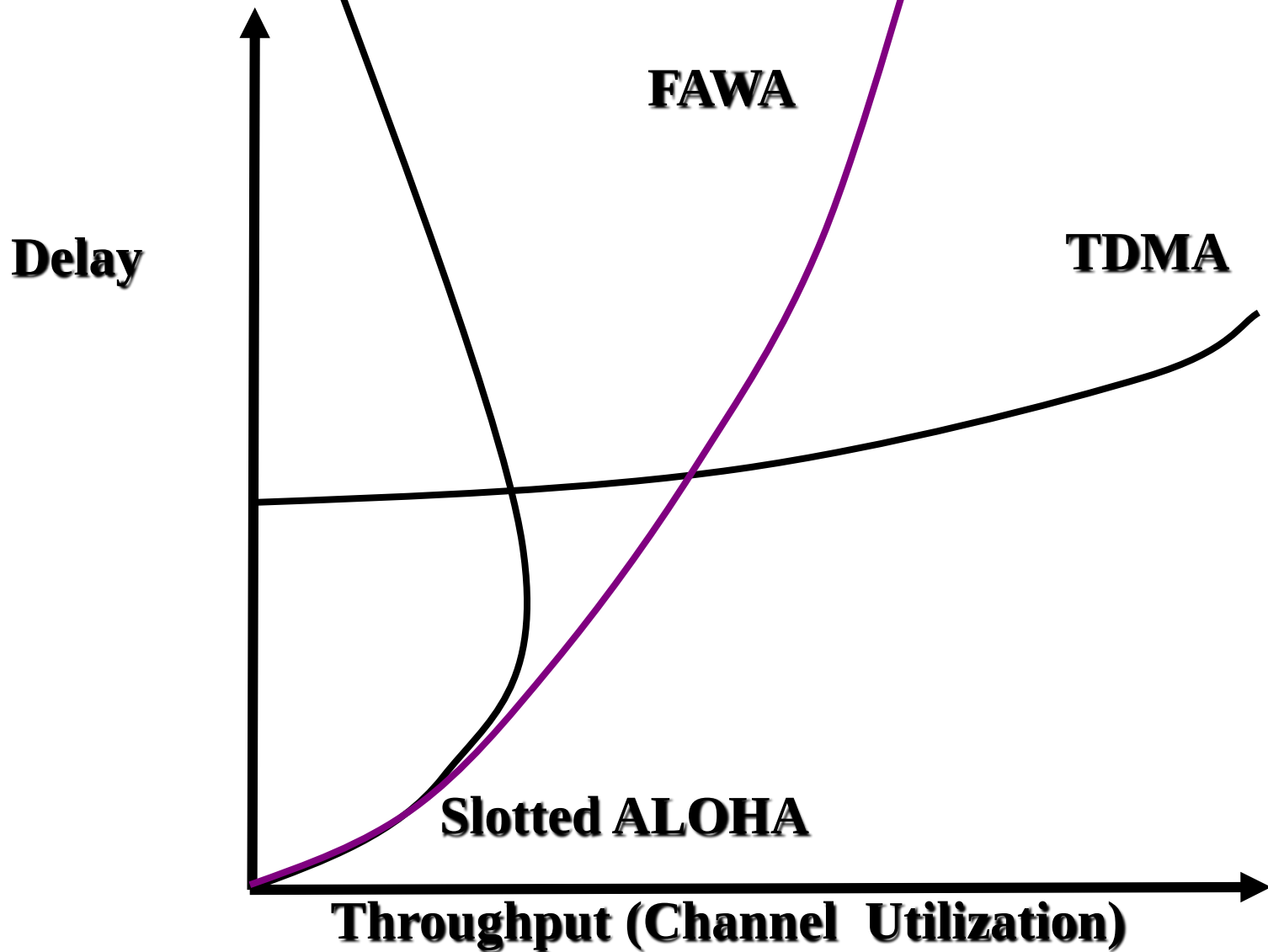
Fixed Assignment based Window Access



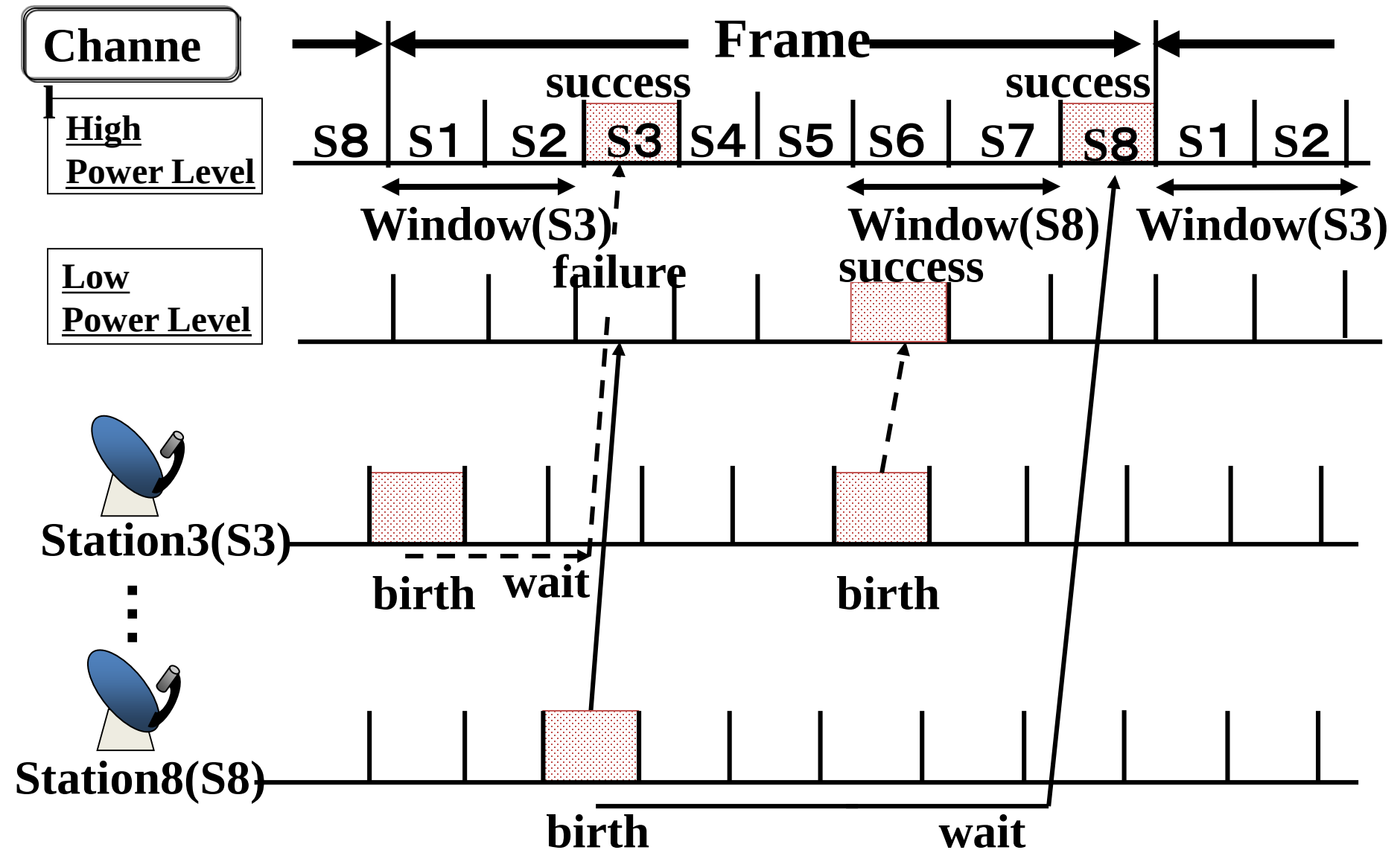
Random Access <-small Window Size large -> TDMA



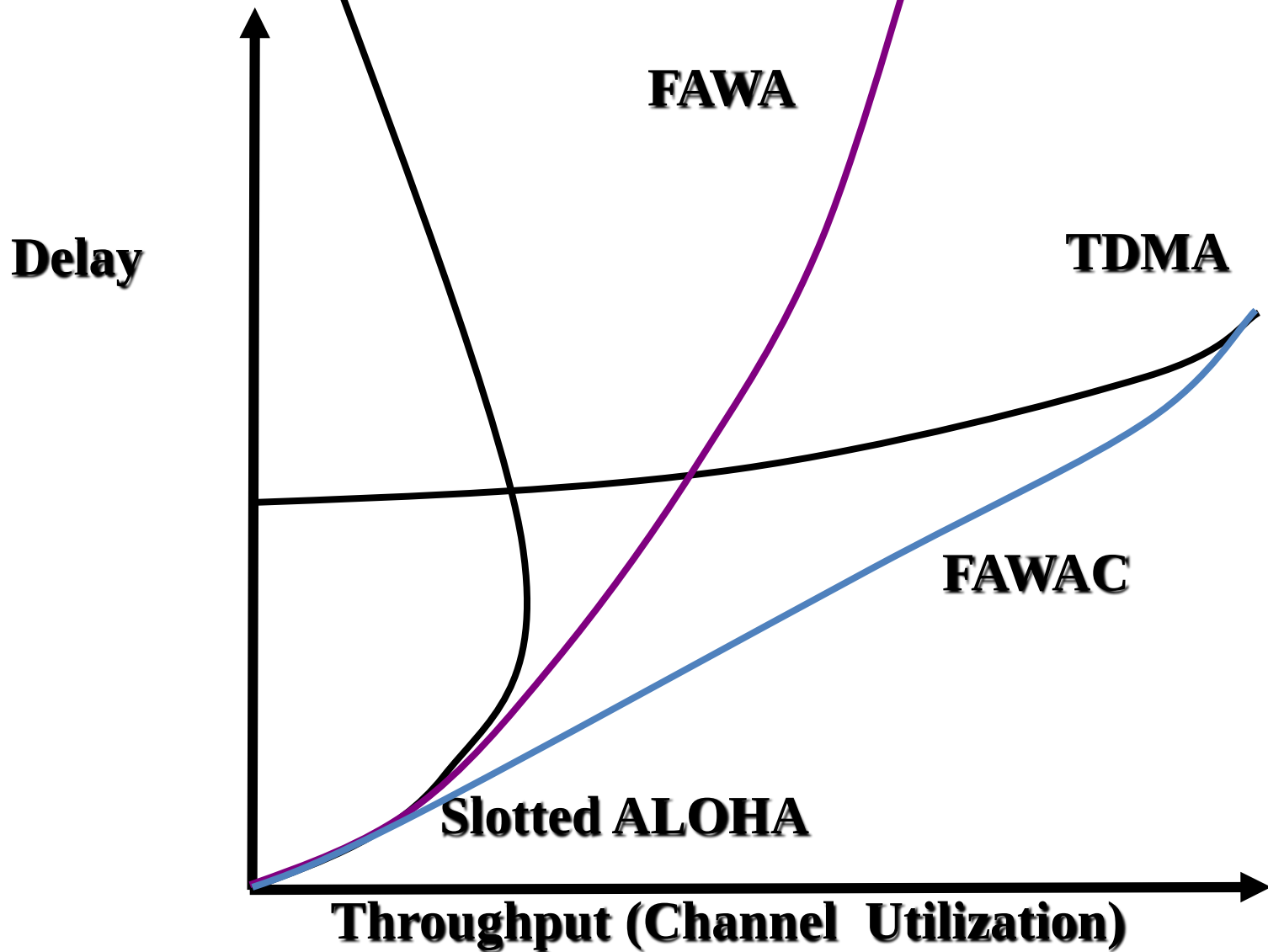
Throughput-Delay Performance



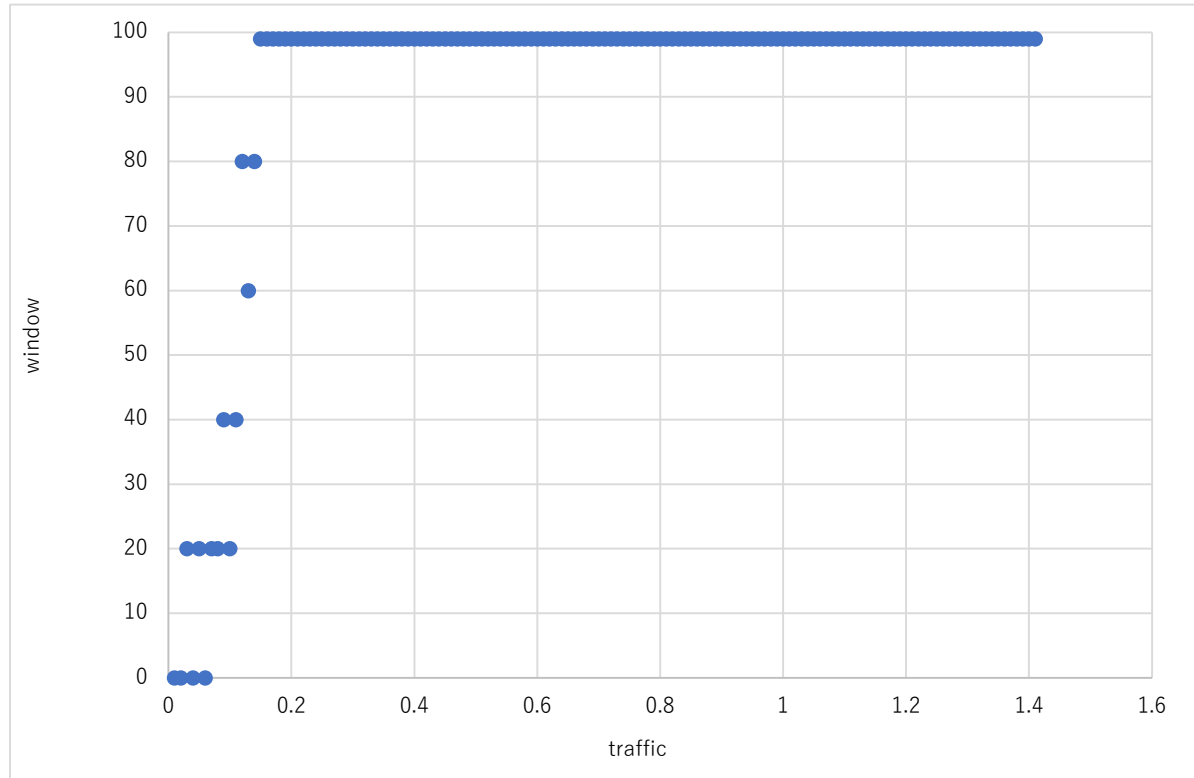
Fixed Assignment based Window Access with Capture



Throughput-Delay Performance

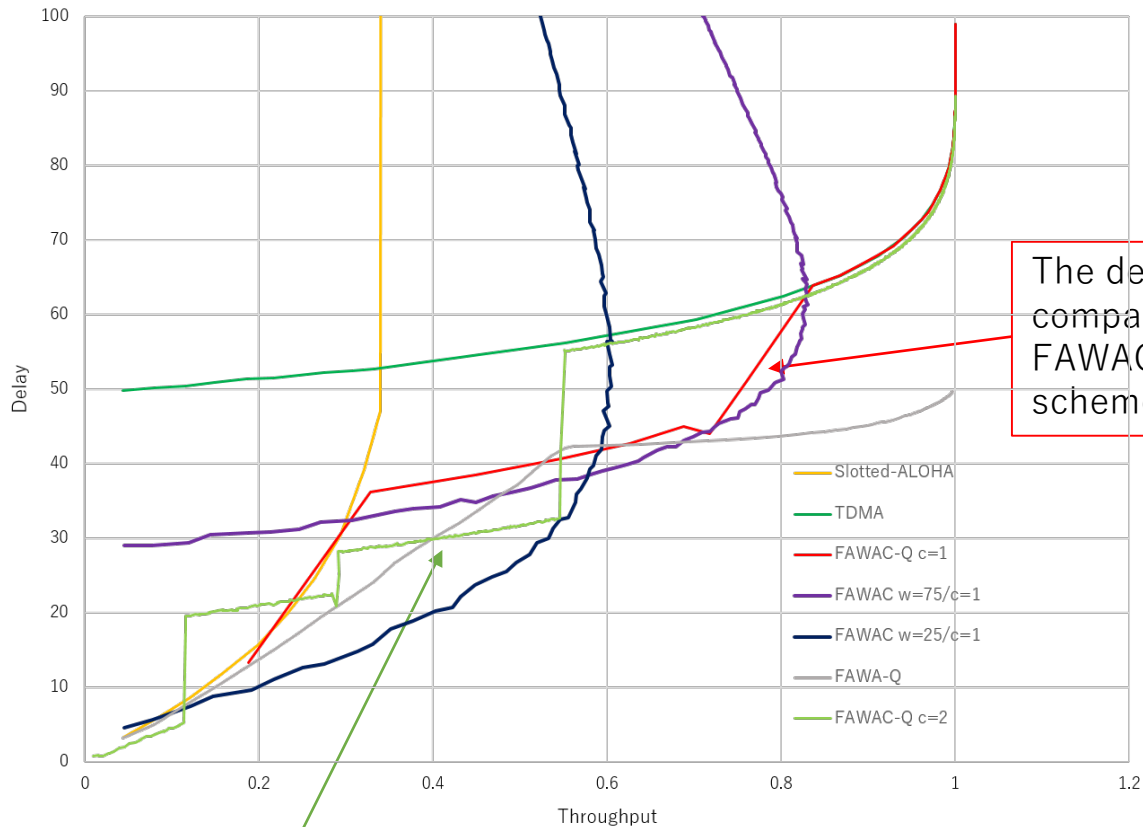


Simulation Result – Window Size



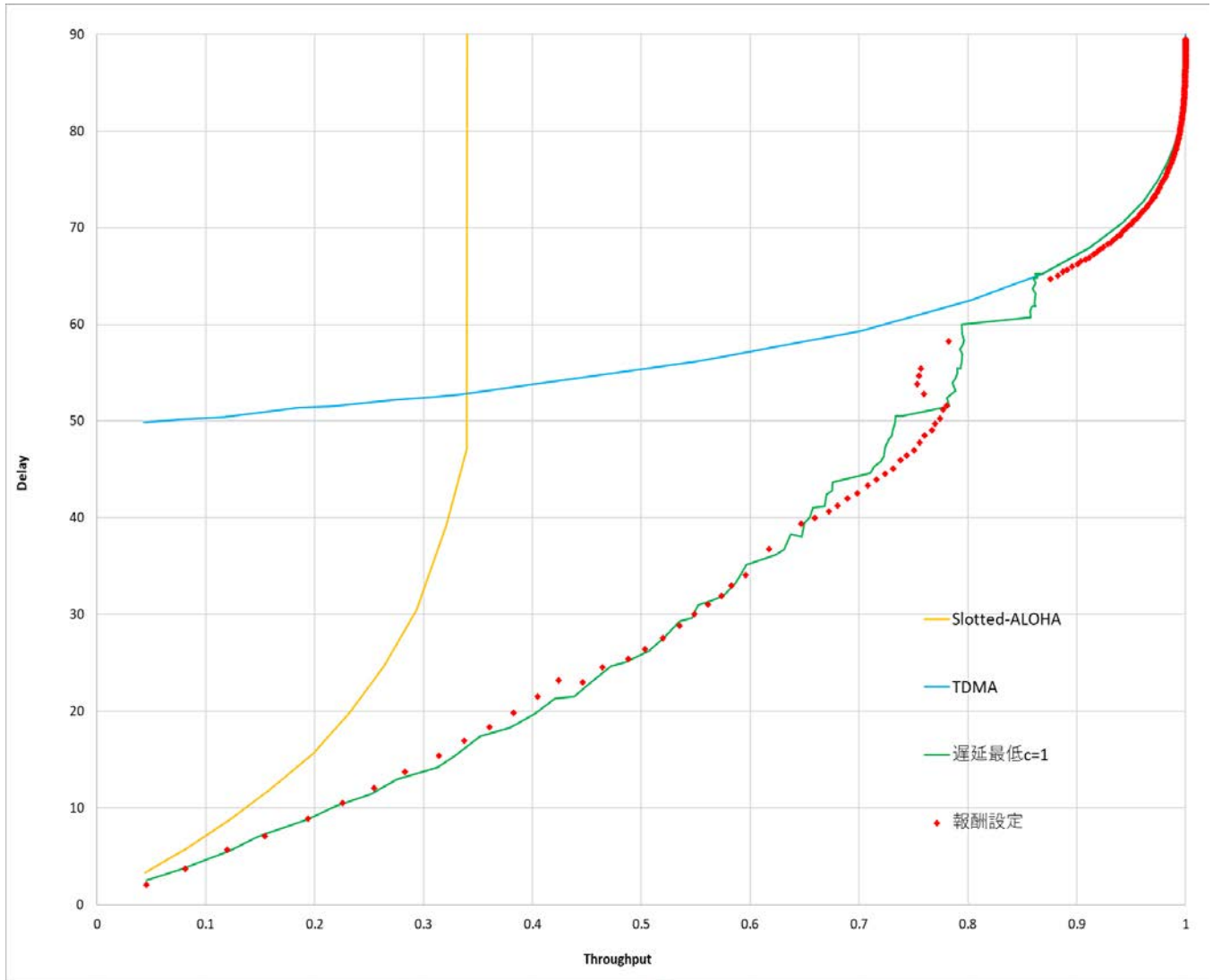
window size did not change along with the traffic increase

Deep Learning Based FAWAC-Q



The delay of FAWAC-Q was higher compare to the conventional FAWAC schemes and FAWA-Q scheme.

FAWAC-Q in reward fixed

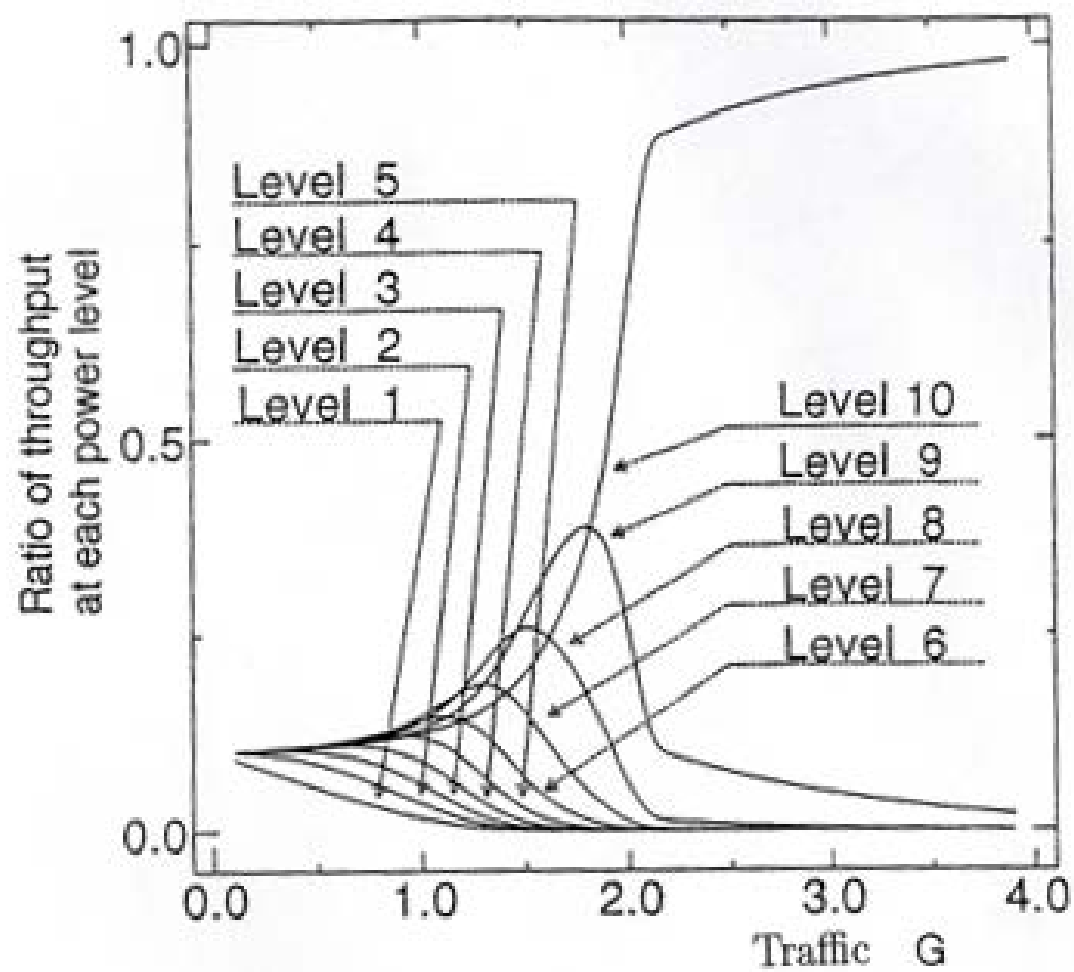


Power Level Division Multiple Access PDMA

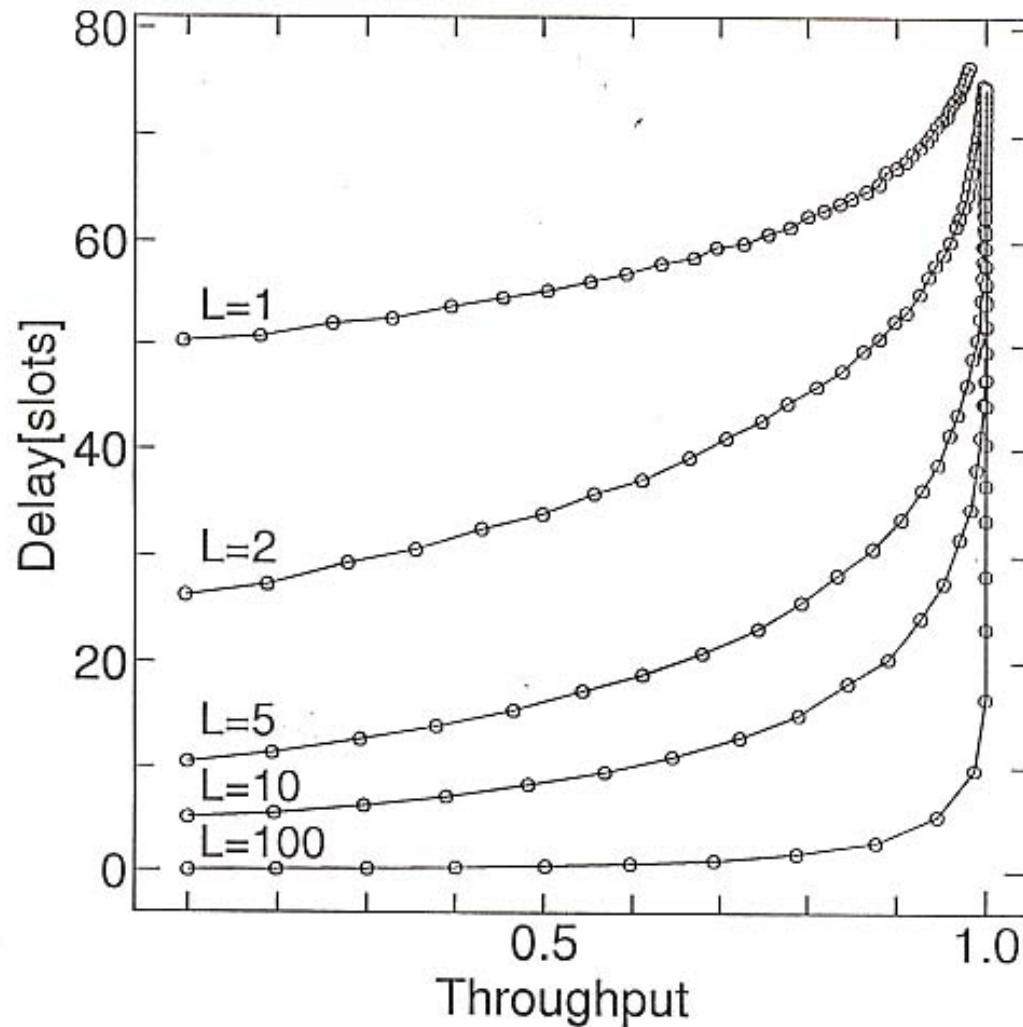
Assign Power Level and Slot for each station.

Power Level	4	R ₃	R ₄	R ₅	R ₆	P ₉	R ₁₀	R ₁₁	R ₁₂	P ₅	P ₆	P ₇	P ₈	P ₁	P ₂	P ₃	P ₄	
	3	P ₉	R ₁₀	R ₁₁	R ₁₂	P ₅	P ₆	P ₇	P ₈	P ₁	P ₂	P ₃	P ₄	R ₃	R ₄	R ₅	R ₆	
	2	P ₅	P ₆	P ₇	P ₈	P ₁	P ₂	P ₃	P ₄	R ₃	R ₄	R ₅	R ₆	P ₉	R ₁₀	R ₁₁	R ₁₂	
	1	P ₁	P ₂	P ₃	P ₄	R ₃	R ₄	R ₅	R ₆	P ₉	R ₁₀	R ₁₁	R ₁₂	P ₅	P ₆	P ₇	P ₈	
slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
		frame 0				frame 1				frame 2				frame 3				
		block																

16 stations, 4 power levels



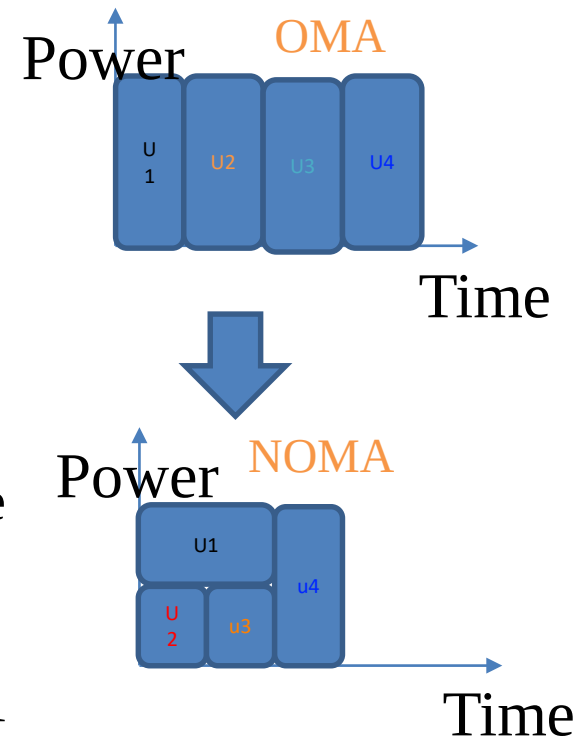
Throughput-Delay Characteristics of PDMA



NOMA方式
NOMA

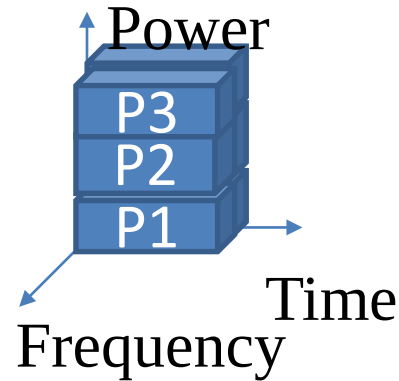
Non Orthogonal Multiple Access (NOMA)

- NOMA technique utilizes power domain to break orthogonality of Orthogonal Multiple access (OMA) system which utilizes a time of frequency domain.
- In power domain, different power level are assign to different users to extract the message signal from the composite signal.
- SIC apply at the receiver side to separate the NOMA users and if small power level difference PIC may be a better option.



NOMA Successive Interference Cancellation(SIC) Receiver

- NOMA uses interference cancellation scheme & is free from collision unlike in OMA.
- For Near-UE to decode Near-UE bits, Far-UE bits need to be known and decoded also.
- Regenerate the interference signal caused by far-UE and cancel it from the received signal using SIC
- Far-UE decodes its own signal, and treats Near-UE as noise.



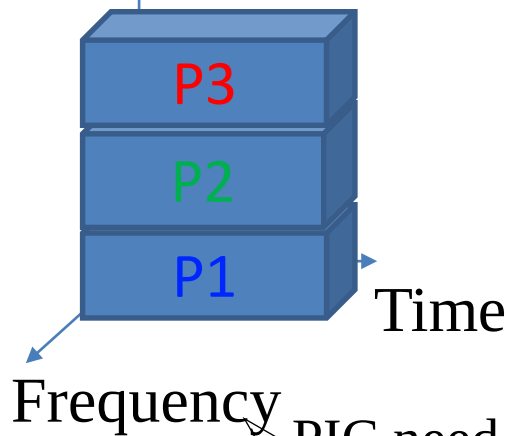
SIC P3 d
SIC P2 d
SIC P1 d

Fig: SIC pr

Parallel interference Cancellation (PIC)

➤ PIC detect and cancel all the interference

Simultaneously. So, by using PIC delay related to SIC Can be minimize.



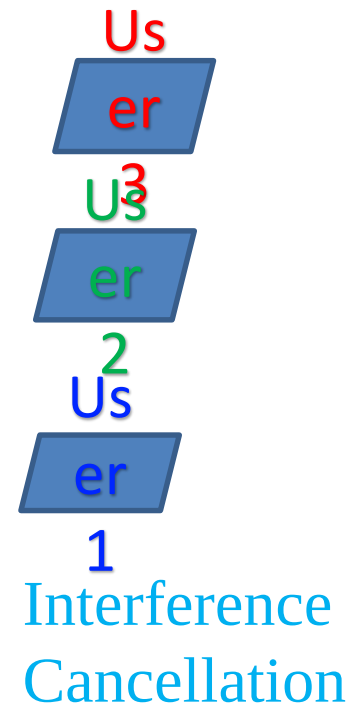
PIC detect P3

PIC detect P2

PIC detect P1

PIC detection

➤ PIC need to use in all UE unlike in SIC.



Power Allocation Strategy:

power level	4	p13	p14	p15	p16	p9	p10	p11	p12	p5	p6	p7	p8	p1	p2	p3	p4
	3	p9	p10	p11	p12	p5	p6	p7	p8	p1	p2	p3	p4	p13	p14	p15	p16
	2	p5	p6	p7	p8	p1	p2	p3	p4	p13	p14	p15	p16	p9	p10	p11	p12
	1	p1	p2	p3	p4	p13	p14	p15	p16	p9	p10	p11	p12	p5	p6	p7	p8
slot		1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	16
		frame 0				frame 1				frame 2				frame 3			

TABLE: Dynamic Power Allocation

Table above is for Dynamic Power Allocation(DPA). A total 16 users with 16 different power and different power are allocated in different power level frame wisely.