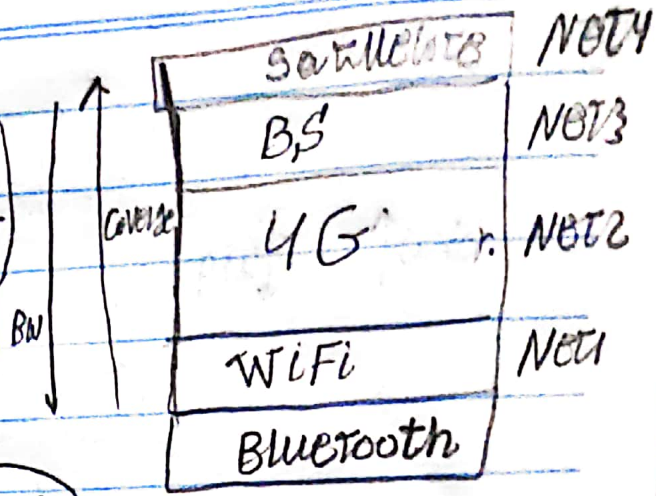
VHO

Vertical Handoff

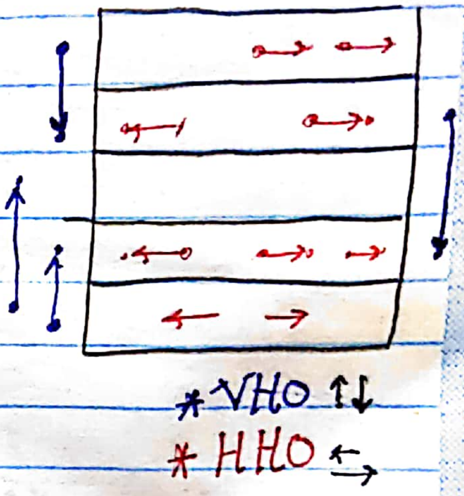
* **VHO**: Change to another AP of different RAT (Inter-network Handoff)

* **HHO**: Change to another AP of same RAT (Intra-network Handoff)

Horizontal Handoff



* Diagonal: Hybrid (VHO + HHO)
  → Media Independent Handover (MIH)



* Attributes of VHO

1. Network:
   BW, RSS, Delay, Coverage, SNR, CCI ——
2. User related (Terminal Device):
   Battery, speed, ——
3. User preferences:
   Set Priority for mentioned Attributes

* Challenges

* Seamless handoff → smooth handoff
* Timing → Avoid Ping-Pong
* Throughput → No loss or delay
* Security
* Power Consumption

* QoS: objective from Network
* QoE: subjective from user

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* Management Process

① Information gathering ② Decision making:
③ Execution of Handoff

Decision Techniques

[1] Naive methods: one feature, less reliable
(ex) Max BW, Min Cost ——

[2] Complex methods: MADM (multiple Attributes Decision making)
- reliable

[2.1] SAW: $N^* = \arg\max_i \left(\sum_{i=1}^{N} W_i N_{i,j} \right)$

[2.2] TOPSIS: $D_i^+ = \sqrt{W_i^2 (V_{i,j} - V_i^+)^2}$

$D_i^- = \sqrt{W_i^2 (V_{i,j} - V_i^-)^2}$

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$N^* = \arg\min \left(\frac{D_i^+}{D_i^+ + D_i^-} \right)$

Game Theory

* Non-Cooperative Games: Conflicting interests between Players
* Static: single stage game (No dependency between Actions)

* Nash equilibrium:
  - State at which no player needs to change action
  - Maximizes both Payoffs
  - ex: state (A,W) or (W,A)

P1 \ P2	W	A
W	0,0	0,1-C
A	1-C,0	-C,-C

* Vertical Handoff

① Formulate a game where P1: {all Devices}
P2: {all Networks}

② Actions = {Connect, Don't Connect}

③ Find Nash equilibrium state where we maximize Payoff for both Devices & Networks

* Note: Nash equilibrium is not optimum always