Mapping of IP on WiFi Access Classes for IPv6 over OCB

Potential new WI

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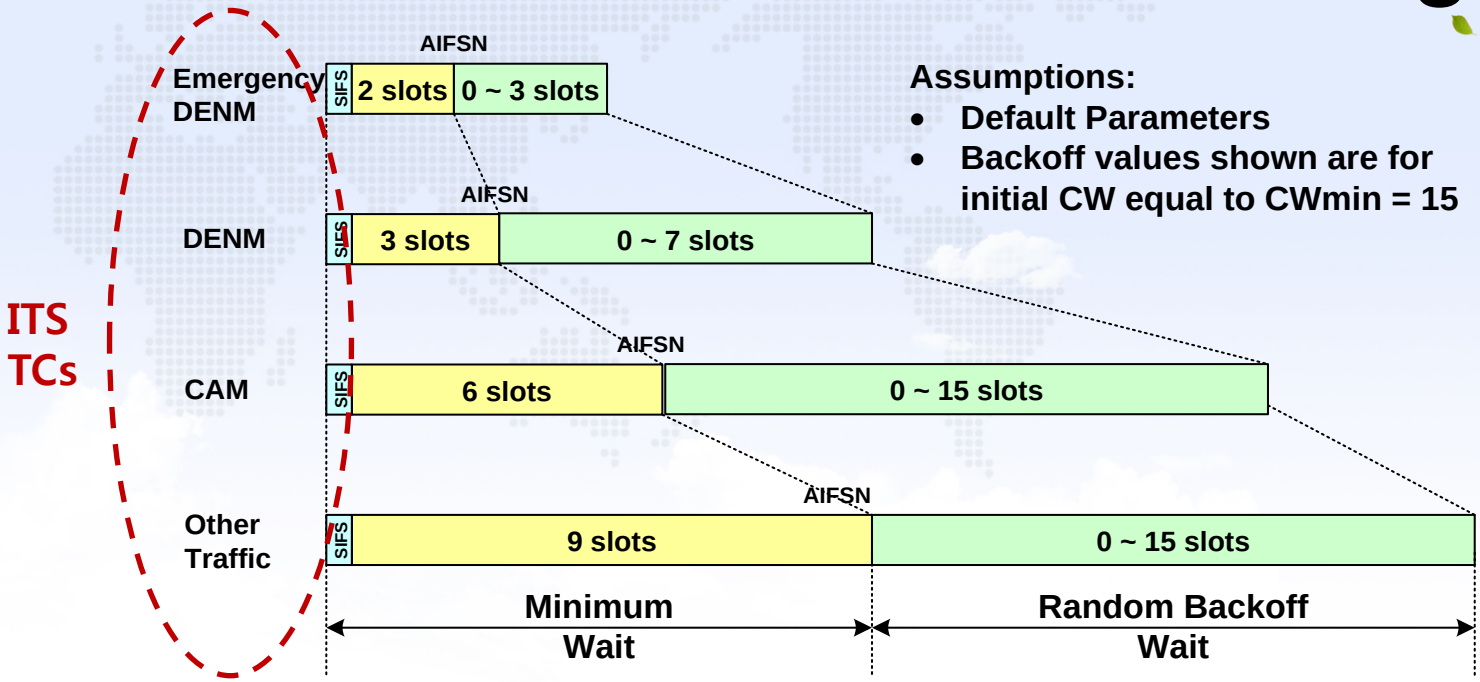
Jérôme Härri

E-mail Address: haerri@eurecom.fr

IEEE 802.11 OCB – Access Categories



- WiFi Access Categories (QoSData)
  - AC_VO: AIFN=2, CWmin=4 CWmax=8
  - AC_VI: AIFN=3, CWmin=8 CWmax=16
  - AC_BE: AIFN=6, CWmin=16 CWmax=1024
  - AC_BK: AIFN=9, CWmin=16 CWmax=1024
- Disclaimer: the terms VO and Video do not restrict traffic on these AC to voice and video only !!

802.1D User Priority (MAC Bridging)

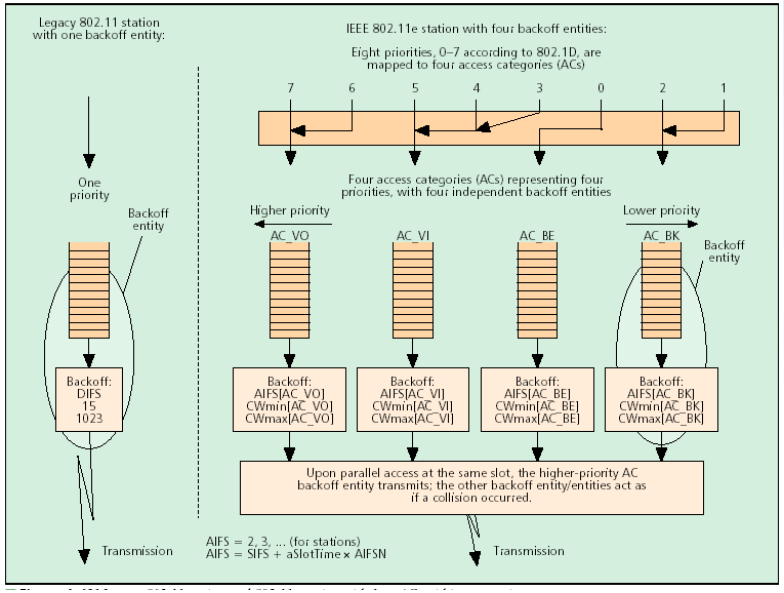
- User Priorities (UP)
  - 7 different classes of LAN traffic
  - A default '0' for anything not specified or not correspinding

user_priority	Acronym	Traffic type
1	BK	Background
2	—	Spare
0 (Default)	BE	Best Effort
3	EE	Excellent Effort
4	CL	Controlled Load
5	VI	"Video," < 100 ms latency and jitter
6	VO	"Voice," < 10 ms latency and jitter
7	NC	Network Control

Source: IEEE 802.1D

Mapping User Priority to Access Categories

Source: IEEE 802.1D



Number of queues	Defining traffic type							
1	BE							
2	BE				VO			
3	BE				CL		VO	
4	BK		BE		CL		VO	
5	BK		BE		CL	VI	VO	
6	BK		BE	EE	CL	VI	VO	
7	BK		BE	EE	CL	VI	VO	NC
8	BK	—	BE	EE	CL	VI	VO	NC

UP

- IEEE 802.1D -> 802.11 AC
  - Leads to potential confusion as function of traffic above IEEE 802.11 (Diffserv)

IP traffic classification – Diffserv DSCP

- IP Differentiated Service Code Point (DSCP)
  - DF: Default Forwarding
  - AFxy: Assured Forwarding (x=class, y=drop precedence)
  - EF: Expedited Forwarding
  - CS: Class Selector
  - VA: Voice Admit

- IP Traffic classification
  - 8 bits:
    - IPv4: Type-of-Service
    - IPv6: Traffic Class
  - Both ToS / TC
    - DSCP is the 6 MSB of ToS/TC

Service Class Name	DSCP Name	DSCP Value	Application Examples
Network Control	CS6	110000	Network routing
Telephony	EF	101110	IP Telephony bearer
Signaling	CS5	101000	IP Telephony signaling
Multimedia Conferencing	AF41,AF42 AF43	100010,100100 100110	H.323/V2 video conferencing (adaptive)
Real-Time Interactive	CS4	100000	Video conferencing and Interactive gaming
Multimedia Streaming	AF31,AF32 AF33	011010,011100 011110	Streaming video and audio on demand
Broadcast Video	CS3	011000	Broadcast TV & live events
Low-Latency Data	AF21,AF22 AF23	010010,010100 010110	Client/server transactions Web-based ordering
OAM	CS2	010000	OAM&P
High-Throughput Data	AF11,AF12 AF13	001010,001100 001110	Store and forward applications
Standard	DF (CS0)	000000	Undifferentiated applications
Low-Priority Data	CS1	001000	Any flow that has no BW assurance

Source: IETF RFC 4594

DSCP – UP Mapping at TX

- Mapping Proposal (default):
  - L3 DSCP: 6 bits
  - L2 UP: 3 bits
  - Mapping: take 3 MSB from L3 DSCP for L2 UP
  - Example: DSCP: 101110 -> UP: 101

- Yet, just one option…just a best practice

- Confusion Examples:
  - **Voice (EF-101110)** will be mapped to UP 5 (101), and treated in the **Video Access Category (AC_VI)** rather than the Voice Access Category (AC_VO), for which it is intended
  - **Multimedia Streaming (AF3-011xx0)** will be mapped to UP 3 (011) and treated in the **Best Effort Access Category (AC_BE)** rather than the Video Access Category (AC_VI), for which it is intended
  - **Broadcast Video (CS3-011000)** will be mapped to UP 3 (011) and treated in the Best Effort Access Category (AC_BE) rather than the Video Access Category (AC_VI), for which it is intended
  - **OAM traffic (CS2-010000)** will be mapped to UP 2 (010) and treated in t he Background Access Category (AC_BK), which is not the intent expresse d in [RFC4594] for this service class

Source: IETF RFC 8325

UP - DSCP Mapping at RX

- Mapping Proposal (default):
  - L3 DSCP: 6 bits
  - L2 UP: 3 bits
  - Mapping: multiply UP by 8 (shift 3 and add 000)
  - Example: DSCP: 101 -> UP: 101000

- Confusion Examples:
  - **Mapping UP 6** (which would include **Voice or Telephony traffic**, see [RFC 4594]) to **CS6**, which [RFC4594] recommends for Network Control
  - **Mapping UP 4** (which would include **Multimedia Conferencing and/or Real-Time Interactive traffic**, see [RFC4594]) to **CS4**, thus losing the ability to differentiate between these two distinct service classes, as recommended
  - **Mapping UP 3** (which would include **Multimedia Streaming and/or Broadcast Video traffic**, see [RFC4594]) to **CS3**, thus losing the ability to differentiate between these two distinct service classes
  - **Mapping UP 2** (which would include Low-Latency Data and/or OAM traffic, see [RFC4594]) to **CS2**, thus losing the ability to differentiate between these two distinct service classes, as recommended in [RFC4594]
  - **Mapping UP 1** (which would include High-Throughput Data and/or Low-Priority Data traffic, see [RFC4594]) to **CS1**, thus losing the ability to differentiate between these two distinct service classes, as recommended in [RFC4594]

Source: IETF RFC 8325

RFC 8325 - Mapping Diffserv to IEEE 802.11

- Describes the issues of DSCP to UP mapping and related confus ions
- Proposes a default mapping to correct them
- Examples:

IETF Diffserv Service Class	PHB	Reference RFC	IEEE 802.11 User Priority	IEEE 802.11 Access Category
Network Control (reserved for future use)	CS7	RFC 2474	7 OR 0 See Security Considerations-Sec.8	AC_VO (Voice) OR AC_BE (Best Effort)
Network Control	CS6	RFC 2474	7 OR 0 See Security Considerations	AC_VO (Voice) OR AC_BE (Best Effort)
Telephony	EF	RFC 3246	6	AC_VO (Voice)
VOICE-ADMIT	VA	RFC 5865	6	AC_VO (Voice)
Signaling	CS5	RFC 2474	5	AC_VI (Video)

Source: IETF RFC 8325

Input to IPWAVE

- Need to define the type of IPWAVE traffic & need to harmonize it with L2 prioritization

- Traffic Mapping must be seen from two levels:
  - L3 IP (DSCP): how would IPWAVE traffic type fit to DSCP definitions
  - L2 UP: would the RFC 8325 proposed mapping fit to IPWAVE traffic
  - L2 UP – AC: cannot play with this (not IETF)

- Tasks:
  - Define IPWAVE type of traffic
  - Check compliancy with RFC 8325
  - Propose modification if necessary
  - Objective: no confusion on IP traffic class due to UP and IEEE 802.11 OCB

- Challenges:
  - So far: AC_BK for IPv6-over-OCB for all type of DSCP…
    - UP 0 is mapped by default to AC_BE !!
  - If IP sends traffic with DSCP as high as a CAM, what to do?