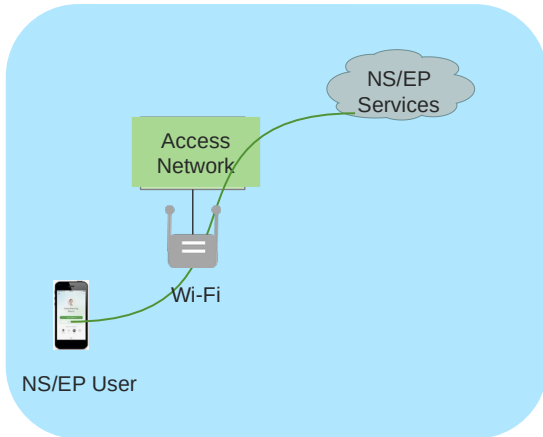
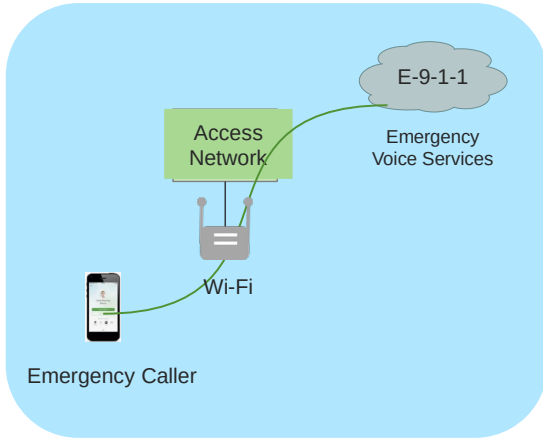


# **RADIUS attributes for National Security and Emergency Preparedness (NS/EP) Services (draft-gundavelli-radepcs-00)**

- Sri Gundavelli (Cisco), Mark Grayson (Cisco) & Subir Das (PeratonLabs)

**IETF 121 Dublin, Nov 4<sup>th</sup>, 2024**

# Mission Critical Services over



- Wi-Fi is increasingly being recognized as a reliable option for transporting flows associated with mission-critical and emergency services.
- Advancements in Wi-Fi Roaming based on Passpoint profiles, and advancements in QoS and Location have provided the needed foundational framework.
- Services like emergency calling, NS/EP priority services supported on cellular access can now be enabled on Wi-Fi access; Emergency Preparedness Communications Service (EPCS) in Wi-Fi 7.
- There are gaps in service authorization workflow

# NS/EP Priority Services

- NS/EP services provide prioritized access to communication networks for first responders, and other emergency personnel during emergencies, ensuring communication during network congestion or outages.
- Communication networks may be congested due to over utilization and ensuring priority access to NS/EP personal is a key requirement.
- These services are deployed by the major US Operators and administered by the Emergency Communication Department (ECD) under DHS/CISA (Department of Homeland Security/Cybersecurity and Infrastructure Security Agency).
  - Similar priority services are operational globally in various countries.

# NS/EP Priority Services in the US

## GETS



Landline Phone



Satellite Phone

- Operational since 1994
- Calling Card service
- Accessible from any domestic or international PSTN phone.

## WPS



Cell Phone

- Operational since 2002
- Accessible from a WPS subscribed phone of a participating carrier by dialing \*272 + Destination Number

## NGN PRIORITY



IP Networks



- Priority Voice  
Core Operational: 2014  
Wireless Access: 2017  
Wireline Access: 2019
- Priority Data, Video and Information Services (e.g., Multimedia Priority Service (MPS) in 5G, Wi-Fi): Work in Progress

# NS/EP Priority Services in other Countries



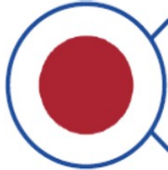
Blue Light Mobile



Mobile Crisis Communications



Mobile Telecommunications Access  
Scheme



Disaster Priority Telephone (優先電話)

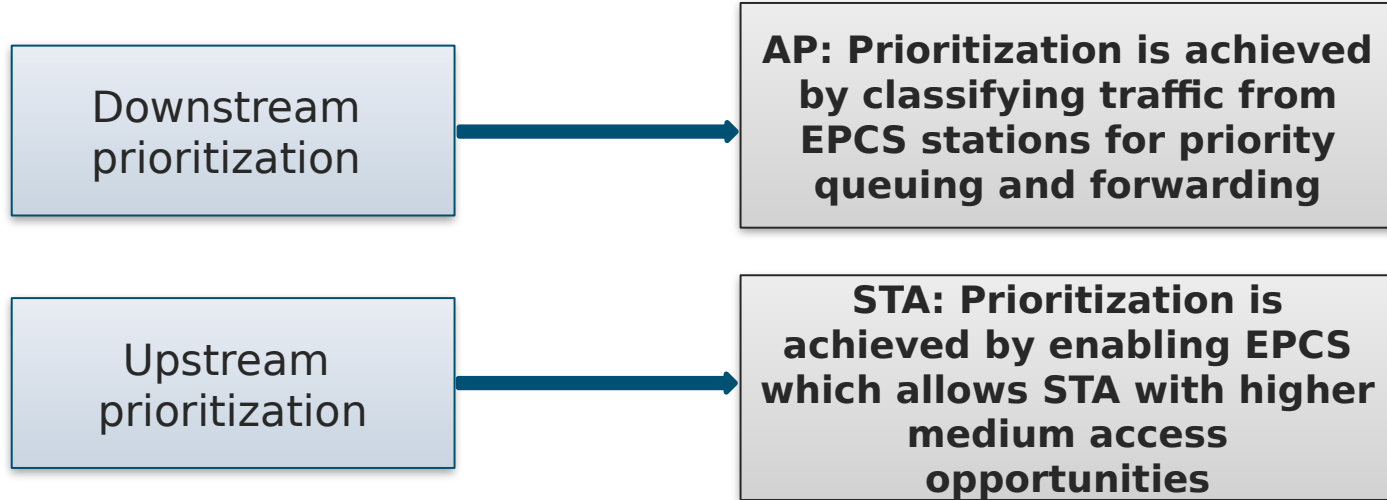


Wireless Priority Services

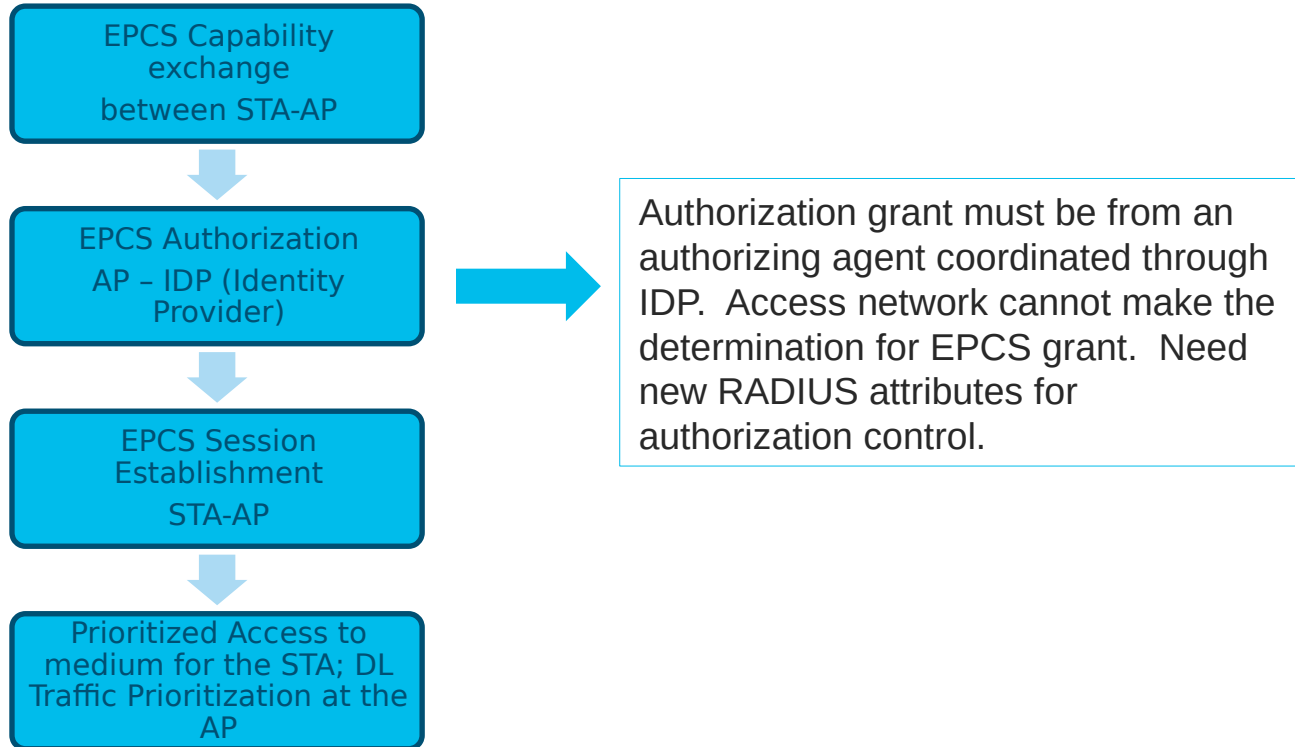
# Priority Services over Wi-Fi

- While Priority Services have traditionally been only supported over cellular networks, there is strong interest from stakeholders for enabling priority services over Wi-Fi.
- Wi-Fi 7 includes EPCS (Emergency Preparedness Communications Service) as a feature for providing priority channel access to authorized priority service users supporting Emergency operations.
- It is now possible to support Multimedia Priority Services Communications (MPS - as specified for cellular networks) over public/private Wi-Fi networks in emergency situations.

# Traffic Prioritization



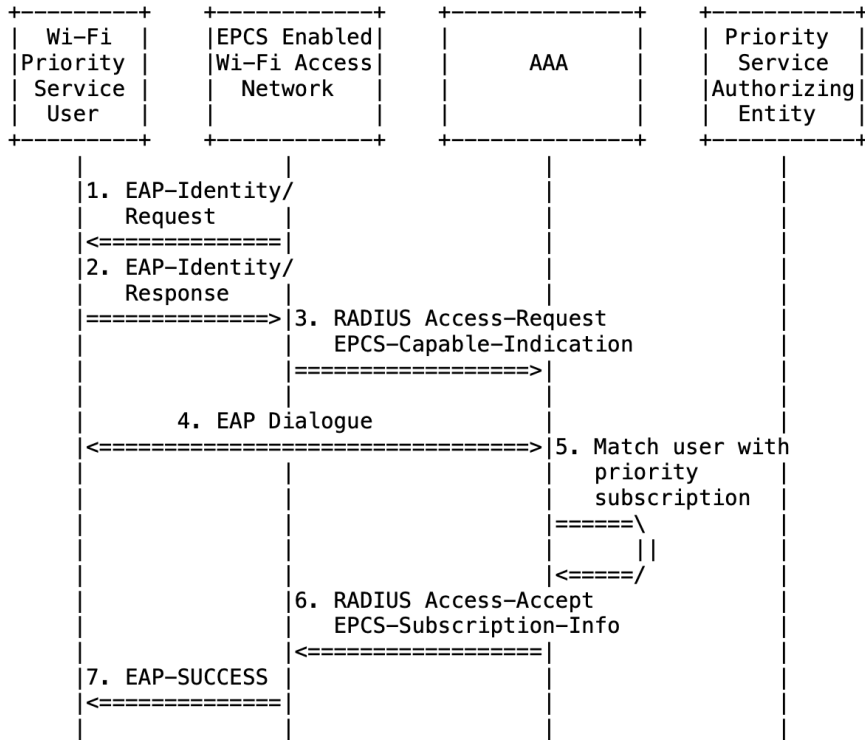
# EPCS Functional Flow with Authorization Control





# RADIUS Exchange for EPCS

- **Authorization** Depending upon the deployment, the Wi-Fi IDP maybe a cellular provider, mirroring the authorization grant from the service operator.





# Proposed RADIUS Attributes

# EPCS Capability Indication

Description:

The EPCS-Capable-Indication (TBA1) Attribute allows a RADIUS NAS to indicate to a RADIUS server that it is EPCS capable.

One EPCS-Capable-Indication Attribute MAY be included in an Access-Request packet.

A summary of the EPCS-Capable-Indication Attribute format as shown here.

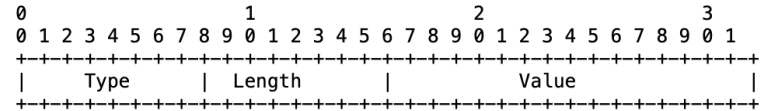


Figure 3: Encoding EPCS-Capable-Indication Attribute

Type

TBA1

Length

6 octet

Data Type

Integer

Value

The field is 2 octets, containing a 16-bit unsigned integer that represents whether the NAS supports EPCS and how the EPCS service can be invoked. This document defines three values used with the EPCS-Capable-Indication attribute:

- 0 The NAS does not support EPCS.
- 1 The provider of the NAS has elected to provide support for priority services to authorized users at all times [FCC].
- 2 The provider of the NAS has elected to provide support for priority services on a per EPCS-flow basis.

# EPCS Subscription Info

## Description:

The EPCS-Subscription-Info (TBA2) Attribute allows a RADIUS Server to indicate to a NAS that a user is authorized to receive priority service.

One EPCS-Subscription-Info Attribute MAY be included in an Access-Accept packet as its presence indicates the authenticated user is authorized to receive priority service.

A summary of the EPCS-Subscription-Info Attribute format is shown here.

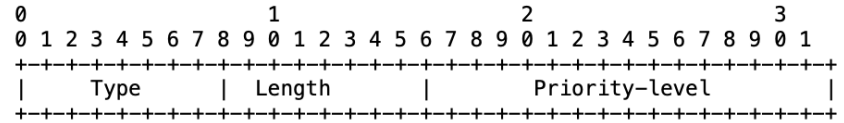


Figure 4: Encoding EPCS-Subscription-Info Attribute

Type

TBA2

Length

6 octet

Data Type

Integer

Value

The field is 2 octets, containing a 16-bit unsigned integer that represents whether the priority level associated with the user's subscription.

# Additional Considerations

- Signaling of flow filters permitting EPCS authorization only to authorized destinations or applications.
- Use of subscription info in accounting flows, allowing access network to report EPCS specific traffic stats.
- Defining RADIUS Change of Authorization (CoA) based EPCS invocation Triggers.
- Work on the draft submission after IETF 121.

**Questions?**



# **Wi-Fi 7 EPCS Background Material**

# EDCA and MU-EDCA Parameters

- When authorized by IDP, the access point will choose EDCA parameters granting higher medium access to the EPCS Station.

## 1. **AIFS (Arbitration Inter-Frame Space):**

- The AIFS is the time interval a station must wait after a medium becomes idle before it can attempt to transmit.
- It is defined for each Access Category (AC).

## 2. **CWmin (Minimum Contention Window):**

- The initial size of the contention window for a specific AC.
- The contention window defines the range from which a random backoff time is chosen after a collision or when the medium is busy.

## 3. **CWmax (Maximum Contention Window):**

- The maximum size of the contention window for a specific AC.
- The contention window size can increase up to CWmax after successive collisions.

## 4. **TXOP (Transmission Opportunity Limit):**

- The maximum duration a station can transmit frames once it gains access to the medium.
- It is defined for each AC and ensures that higher-priority traffic can access the medium more frequently.



# Defaults for EDCA and MU-EDCA Parameters

```
Ac Parameters ACI 2 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
> ACI / AIFSN Field: 0x03
  v ECW: 0xa4
    1010 .... = ECW Max: 10
    .... 0100 = ECW Min: 4
    CW Max: 1023
    CW Min: 15
    TXOP Limit: 0
  v Ac Parameters ACI 1 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
    > ACI / AIFSN Field: 0x27
      v ECW: 0xa4
        1010 .... = ECW Max: 10
        .... 0100 = ECW Min: 4
        CW Max: 1023
        CW Min: 15
        TXOP Limit: 0
```

```
v Ac Parameters ACI 2 (Video), ACM no, AIFSN 2, ECWmin/max 3/4 (CWmin/max 7/15), TXOP 94
  > ACI / AIFSN Field: 0x42
    v ECW: 0x43
      0100 .... = ECW Max: 4
      .... 0011 = ECW Min: 3
      CW Max: 15
      CW Min: 7
      TXOP Limit: 94
  v Ac Parameters ACI 3 (Voice), ACM yes, AIFSN 2, ECWmin/max 2/3 (CWmin/max 3/7), TXOP 87
    > ACI / AIFSN Field: 0x72
      v ECW: 0x32
        0011 .... = ECW Max: 3
        .... 0010 = ECW Min: 2
        CW Max: 7
        CW Min: 3
        TXOP Limit: 47
```

```
v MUAC_VI Parameter Record
  v AIC/AIFSN: 0x42
    .... 0010 = AIFSN: 2
    ...0 .... = Admission Control Mandatory: No
    .10. .... = ACI: Video (2)
    0... .... = Reserved: 0
    ECWmin/ECWmax: 0x43
    MU EDCA Timer: 0xff
  v MUAC_VO Parameter Record
    v AIC/AIFSN: 0x62
      .... 0010 = AIFSN: 2
      ...0 .... = Admission Control Mandatory: No
      .11. .... = ACI: Voice (3)
      0... .... = Reserved: 0
      ECWmin/ECWmax: 0x32
      MU EDCA Timer: 0xff
```

```
v MUAC_BE Parameter Record
  v AIC/AIFSN: 0x03
    .... 0011 = AIFSN: 3
    ...0 .... = Admission Control Mandatory: No
    .00. .... = ACI: Best Effort (0)
    0... .... = Reserved: 0
    ECWmin/ECWmax: 0xa4
    MU EDCA Timer: 0xff
  v MUAC_BK Parameter Record
    v AIC/AIFSN: 0x27
      .... 0111 = AIFSN: 7
      ...0 .... = Admission Control Mandatory: No
      .01. .... = ACI: Background (1)
      0... .... = Reserved: 0
      ECWmin/ECWmax: 0xa4
      MU EDCA Timer: 0xff
```

# EDCA Parameters for EPCS

➤ **Station** Example EPCS EDCA parameters; Upon authorization grant from the IDP providing EPCS Subscription information for the Station.

- EDCA BE aifsn 2 cwmin 3 cwmax 6 txoplimit 94
- EDCA BK aifsn 2 cwmin 3 cwmax 6 txoplimit 40
- EDCA VI aifsn 1 cwmin 2 cwmax 4 txoplimit 94
- EDCA VO aifsn 1 cwmin 2 cwmax 4 txoplimit 40
- MU-EDCA BE aifsn 2 cwmin 3 cwmax 6 timer 255
- MU-EDCA BK aifsn 2 cwmin 3 cwmax 6 timer 255
- MU-EDCA VI aifsn 1 cwmin 2 cwmax 4 timer 255
- MU-EDCA VO aifsn 1 cwmin 2 cwmax 4 timer 255