RADIUS Attributes for 5G Authentication

(https://datatracker.ietf.org/doc/draft-gundavelli-radext-5g-auth/)

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**Motivation**

- Private network architectures in general are very complex and have evolved over a long period of time. These architectures are access agnostic, supporting Ethernet and Wi-Fi based access technologies, with deployed network elements for performing identity, policy, mobility, security and network management functions.

- As 5G makes it into enterprise environments, the key objective from the private network operator point of view is to make Private 5G as just another access technology, operated by one identity, policy management system.
Access Architectures

Diagram showing various components and their interconnections:
- AUSF
- UDM
- PCF
- CHF
- AMF
- SMF
- UPF
- UE (User Equipment)
- gNB
- UDM
- UPF
- N1, N2, N3, N4, N6, N7, N8, N12, N13, N14, N40

Additional components:
- Client
- Access Point
- Wireless LAN Controller (WLC)
- Internet
- Wi-Fi
- RADIUS

Key components explained:
- **AA**: Authorization and Accounting
- **AUSF**: Access and User Service Function
- **AMF**: Access and Mobility Management Function
- **gNB**: 5G-NGMN2
- **PCF**: Policy Control Function
- **UDM**: Unified Data Management
- **CHF**: Core and Home Function
- **UPF**: User Plane Function
- **UE**: User Equipment
- **Wi-Fi**: Wireless Local Area Network
- **Wireless LAN Controller (WLC)**: Part of Wi-Fi infrastructure
Enterprise Use Case

- It is logical to reuse much of the deployed elements in the enterprise network. Enterprises have deployed AAA infrastructure for identity, authentication and policy management. There is value in extending its scope to Private 5G.
Proposal Summary

- This document proposes extensions to the Remote Authentication Dial-In User Service (RADIUS) protocol for supporting the 3rd Generation Partnership Project (3GPP) 5G Authentication and Key Agreement (5G-AKA) authentication method.

- The 5G-AKA protocol is a key authentication method used in 5G networks for mutual authentication and key derivation between user devices and the network. By integrating 5G-AKA into RADIUS, enterprises can leverage existing RADIUS-based authentication infrastructure for authenticating 5G devices.
Example Call Flow

1. NAS Message (SUCI or 5G-GUTI)

2. RADIUS Access-Request (SUCI or SUPI, SN-Name)

3. RADIUS Access-Accept (SUPI, RAND, AUTN, HXRES*, KSEAF, DNN, IMEI)

4. NAS Authentication Request (RAND, AUTN)

SUCI to SUPI conversion
Lookup based on SUPI
Generates 5G-AKA Authentication Vector

SUPI, ki, opc
# RADIUS Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5G-Auth-RAND</td>
<td>String</td>
<td>Random number part of the authentication vector.</td>
</tr>
<tr>
<td>5G-Auth-AUTN</td>
<td>String</td>
<td>Authentication token part of the authentication vector.</td>
</tr>
<tr>
<td>5G-Auth-HXRES-STAR</td>
<td>String</td>
<td>It is a hash expected response which is part of the authentication vector.</td>
</tr>
<tr>
<td>5G-Auth-KSEAF</td>
<td>String</td>
<td>Security anchor key used to derive KAMF key.</td>
</tr>
<tr>
<td>5G-SN-NAME</td>
<td>String</td>
<td>Network Identifier includes PLMN and NID.</td>
</tr>
<tr>
<td>5G-Auth-AUTS</td>
<td>String</td>
<td>Value of authentication token used for resync.</td>
</tr>
<tr>
<td>5G-DNN</td>
<td>String</td>
<td>5G Construct for service name.</td>
</tr>
</tbody>
</table>
Next Steps

- Plan to revise the draft with resync call flows, service authorization attributes and other details.
- We need some feedback from the working group.
COMMENTS?