VoWifi Nodes

03

- ePDG
- AAA
- KPI & Performce

VoWiFi Series

Wifi Calling Architecture

Contents

- VoWifi Nodes
- Role of ePDG , AAA & UE
- Role of PGW , HSS , IMS , PCRF for VoWifi
- KPI & Performance of VoWifi
- Measure User Experience of VoWifi

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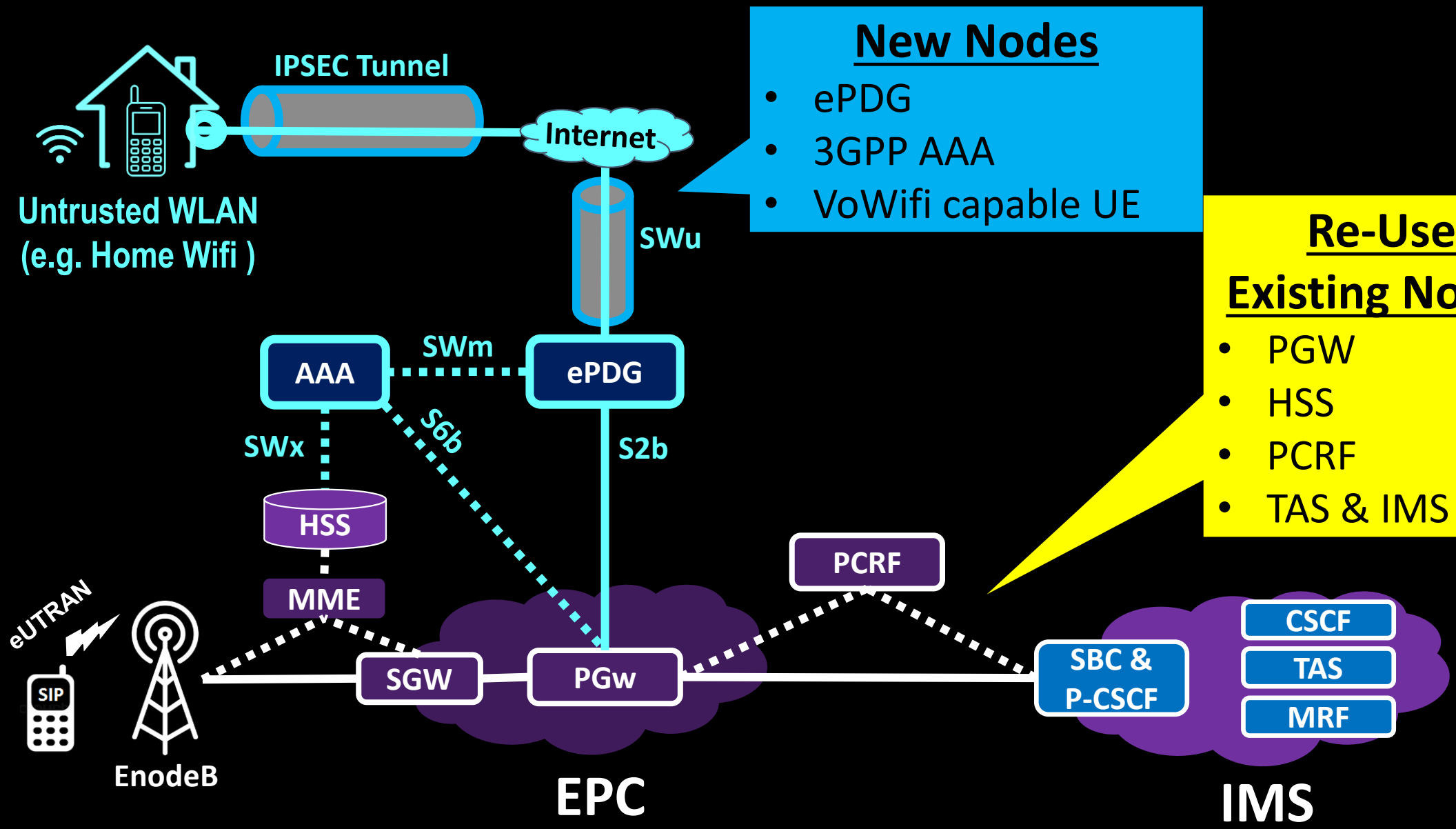
Introduction



New Nodes

- ePDG
- 3GPP AAA
- VoWifi capable UE

Re-Use Existing Nodes

- PGW
- HSS
- PCRF
- TAS & IMS Core

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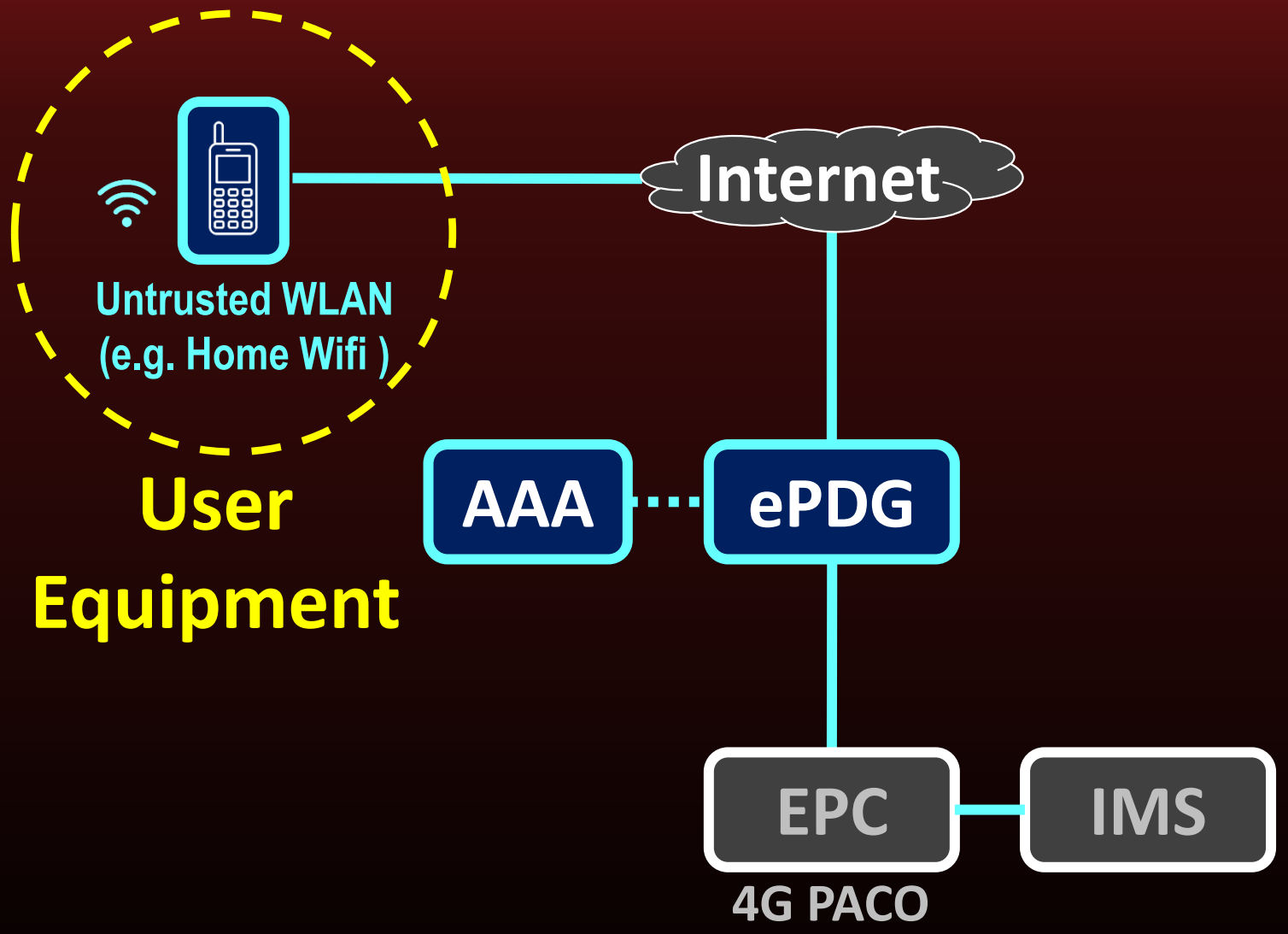
SECTION

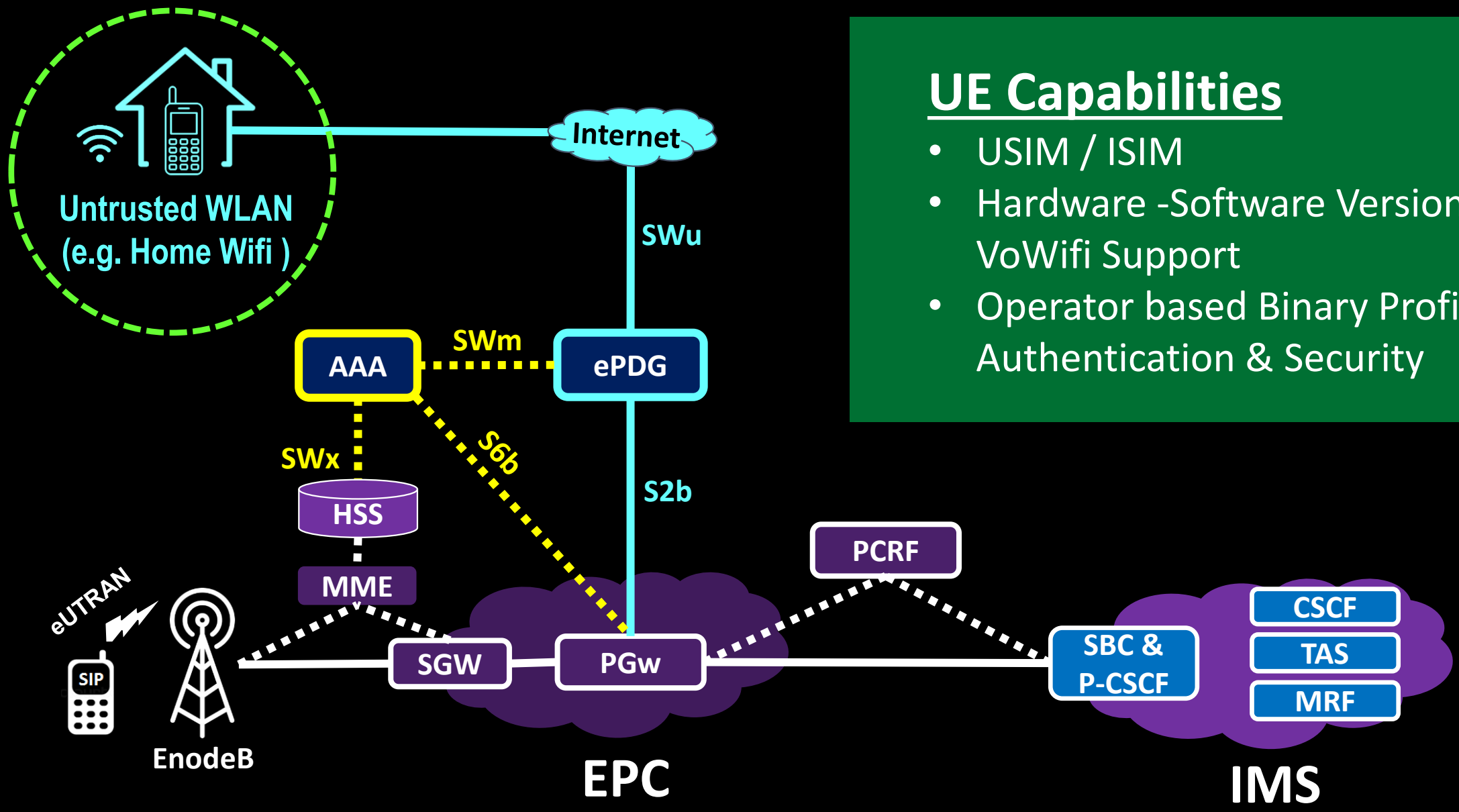
1

Role of UE

Role of UE - Untrusted WLAN



UE Basics & Main Functions



UE Capabilities

- USIM / ISIM
- Hardware -Software Version for VoWifi Support
- Operator based Binary Profile , Authentication & Security

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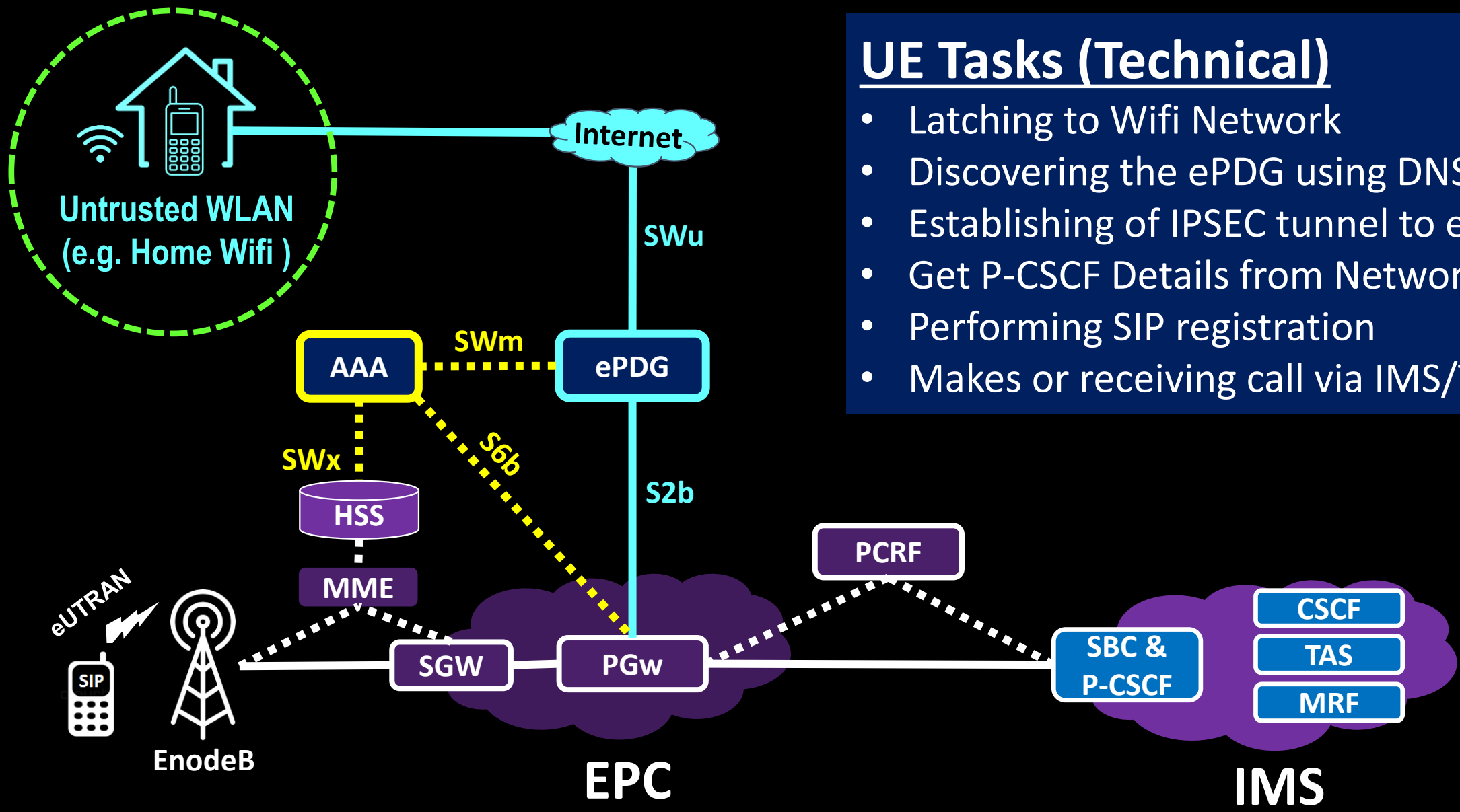
UE Basics & Main Functions



UE Tasks (Technical)

- Latching to Wifi Network
- Discovering the ePDG using DNS
- Establishing of IPSEC tunnel to ePDG
- Get P-CSCF Details from Network
- Performing SIP registration
- Makes or receiving call via IMS/TAS

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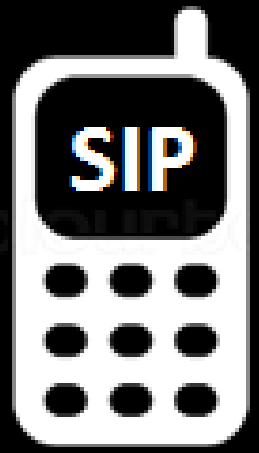
UE Basics & Main Functions



Carrier bundle In Handset

Key Decisions taken by UE

- Default VoWifi Call (Y/N) ?
- VoLTE to VoWifi & Vice Versa Handover Allowed (Y/N)?
- VoLTE / VoWifi thresholds - Wifi Signal , LTE Signal , Jitter / Packet loss / Packet Delay on Wifi Network
- Timers : Guard Timer xx Sec to avoid Ping pong between VoWifi and VoLTE
- Encryption Algorithm & Key Life time
- APN Details, ePDG Address etc..

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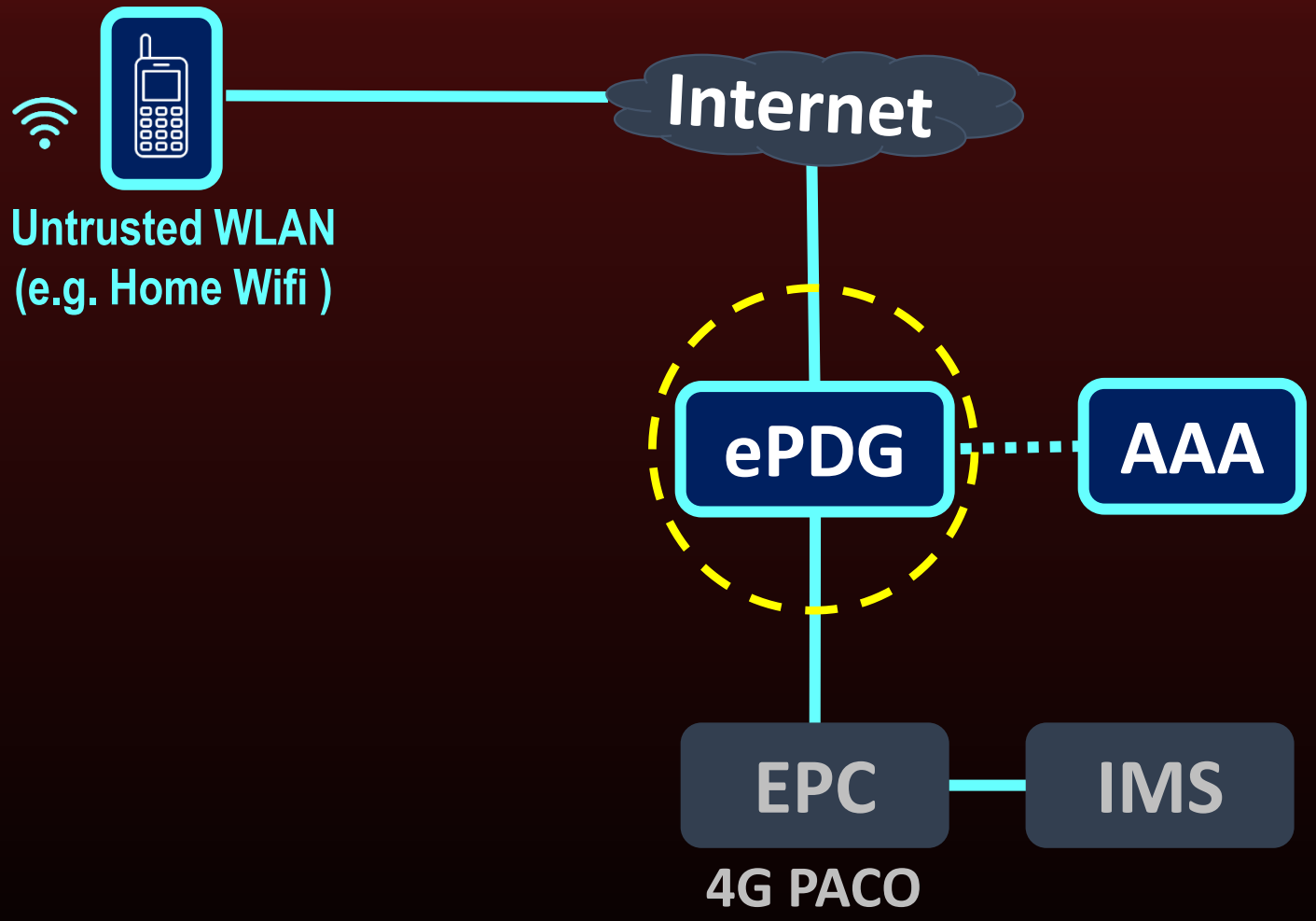
SECTION

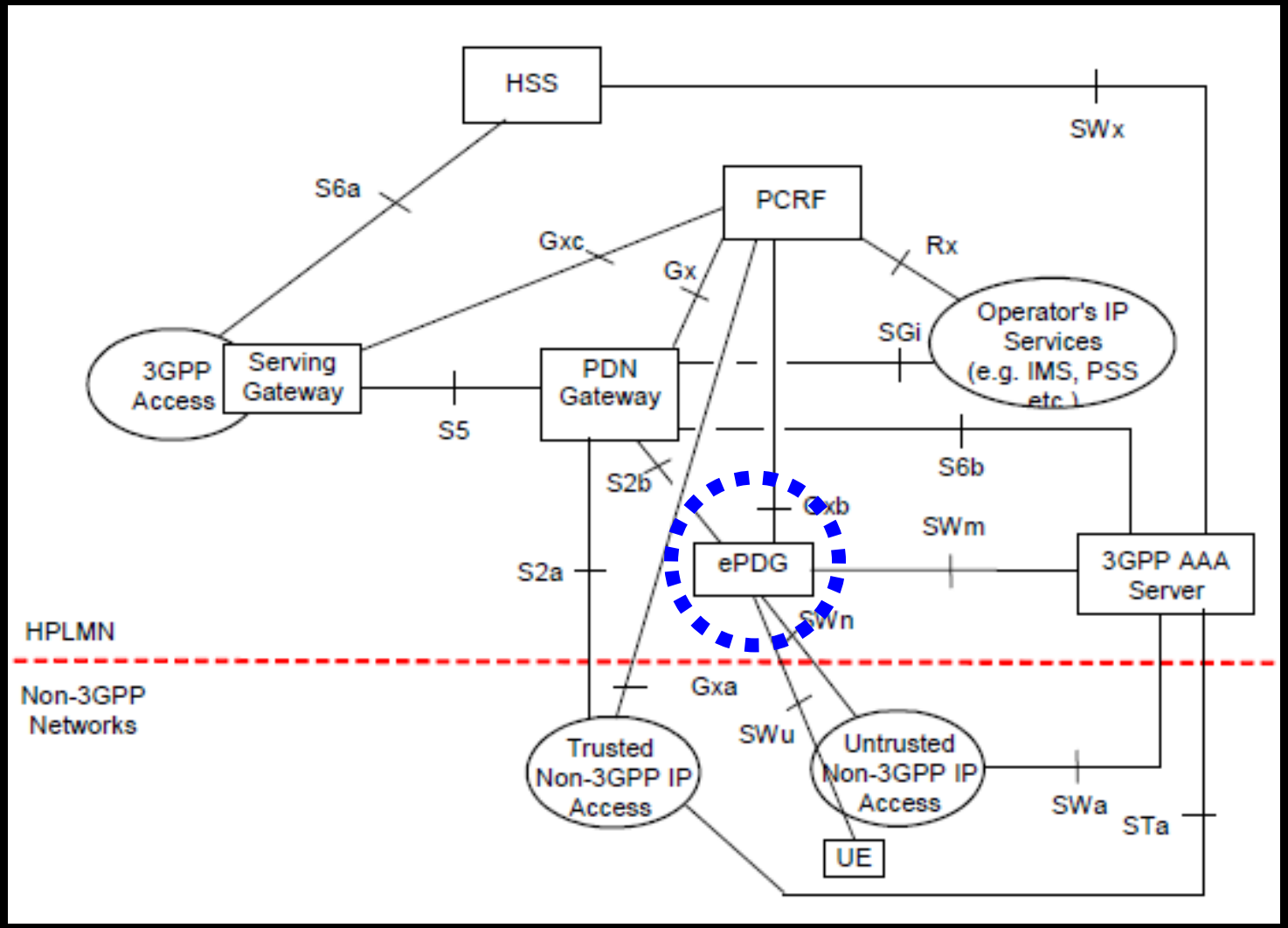
2

Role of ePDG

Role of ePDG - Untrusted WLAN



ePDG Overview & 3GPP Specs



ePDG Overview

- **Specs :** TS 23.402
- Connect UE to EPC
- Act as Gateway
- Terminates IPSEC Tunnel

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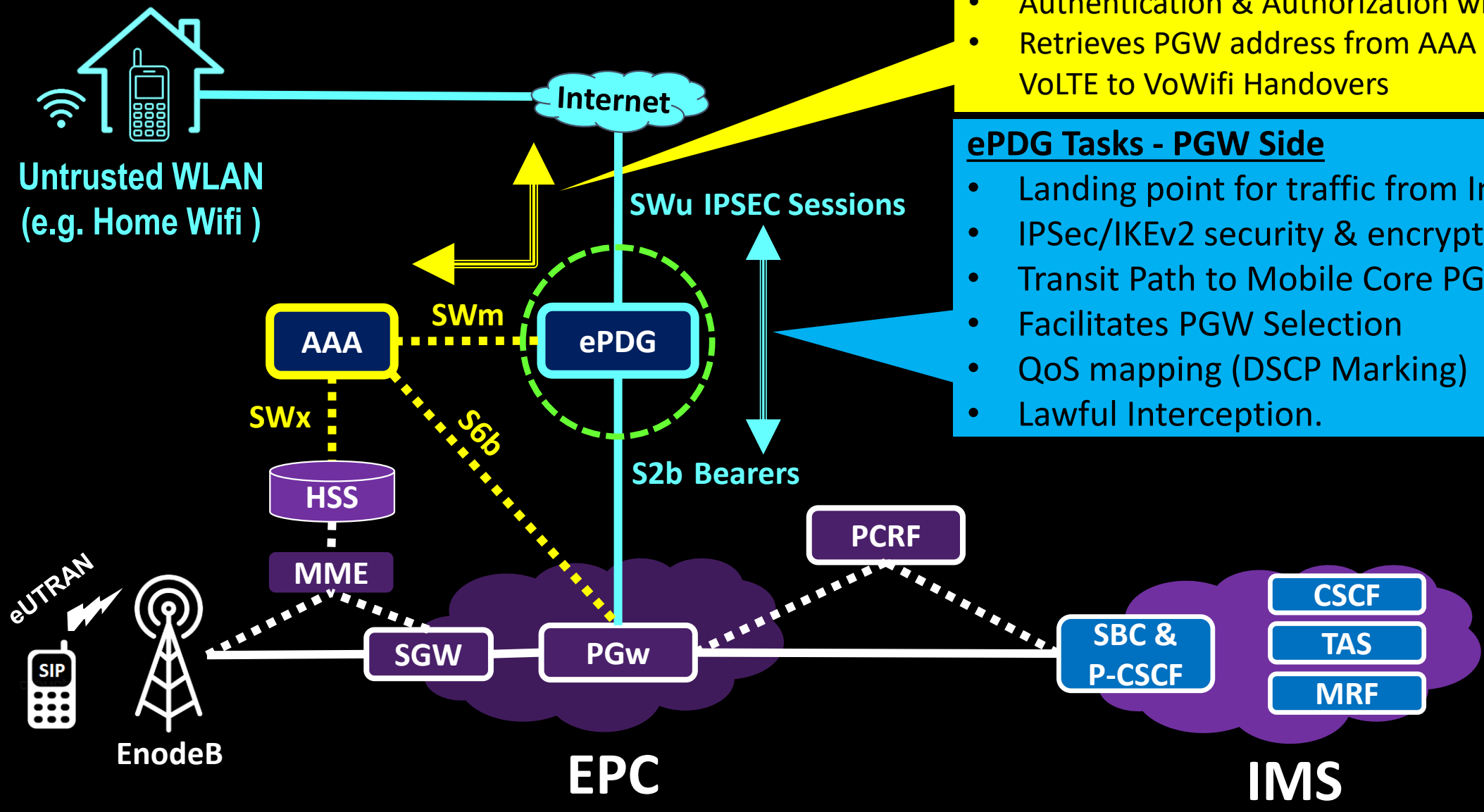
ePDG Basics – Main Functions

3GPP TS 23.402



ePDG Tasks - AAA Side

- Authentication & Authorization with AAA
- Retrieves PGW address from AAA to facilitate VoLTE to VoWifi Handovers

ePDG Tasks - PGW Side

- Landing point for traffic from Internet
- IPSec/IKEv2 security & encryption
- Transit Path to Mobile Core PGW
- Facilitates PGW Selection
- QoS mapping (DSCP Marking)
- Lawful Interception.

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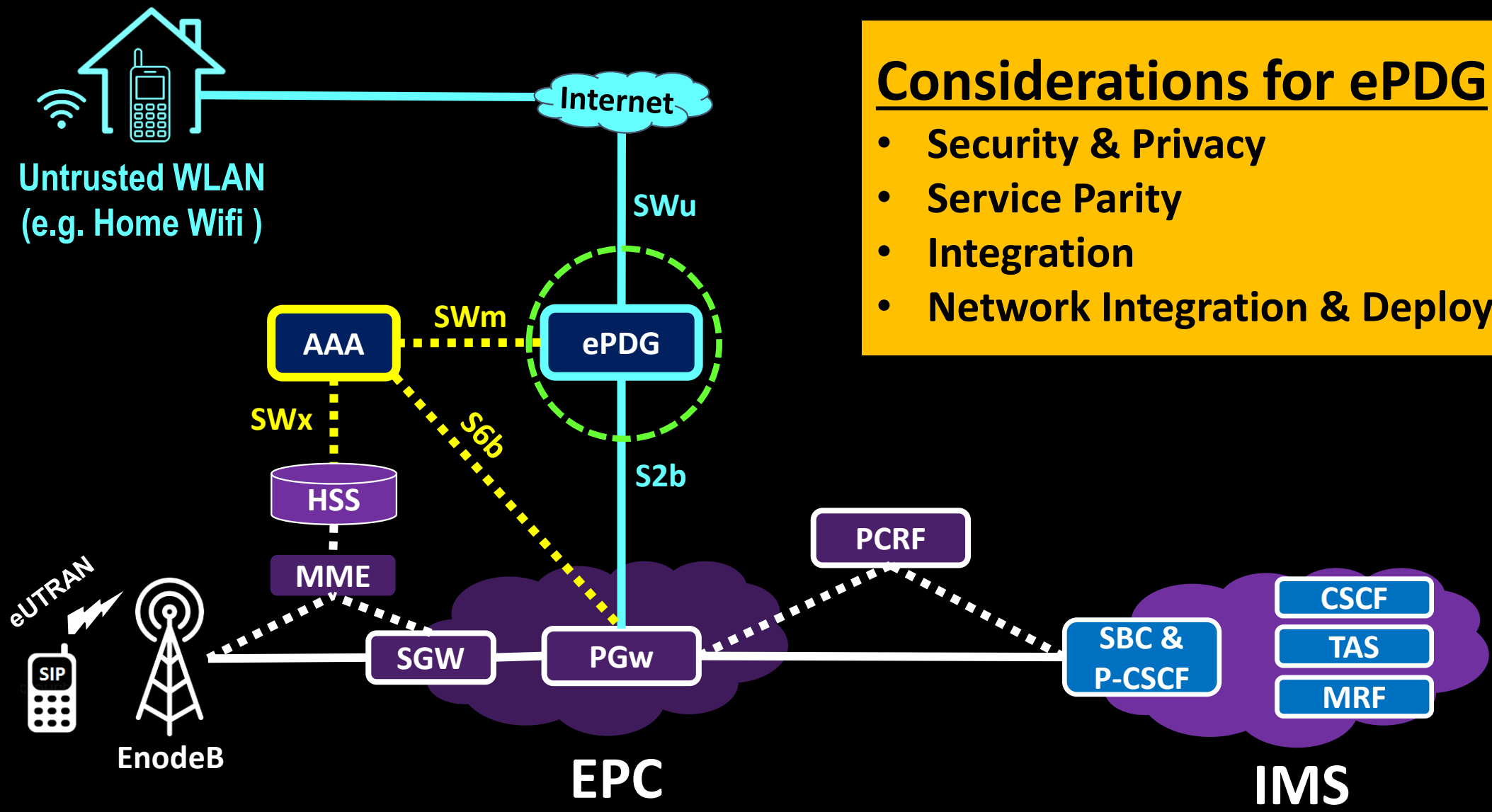
ePDG Basics – Considerations

3GPP TS 23.402



Considerations for ePDG

- Security & Privacy
- Service Parity
- Integration
- Network Integration & Deployment

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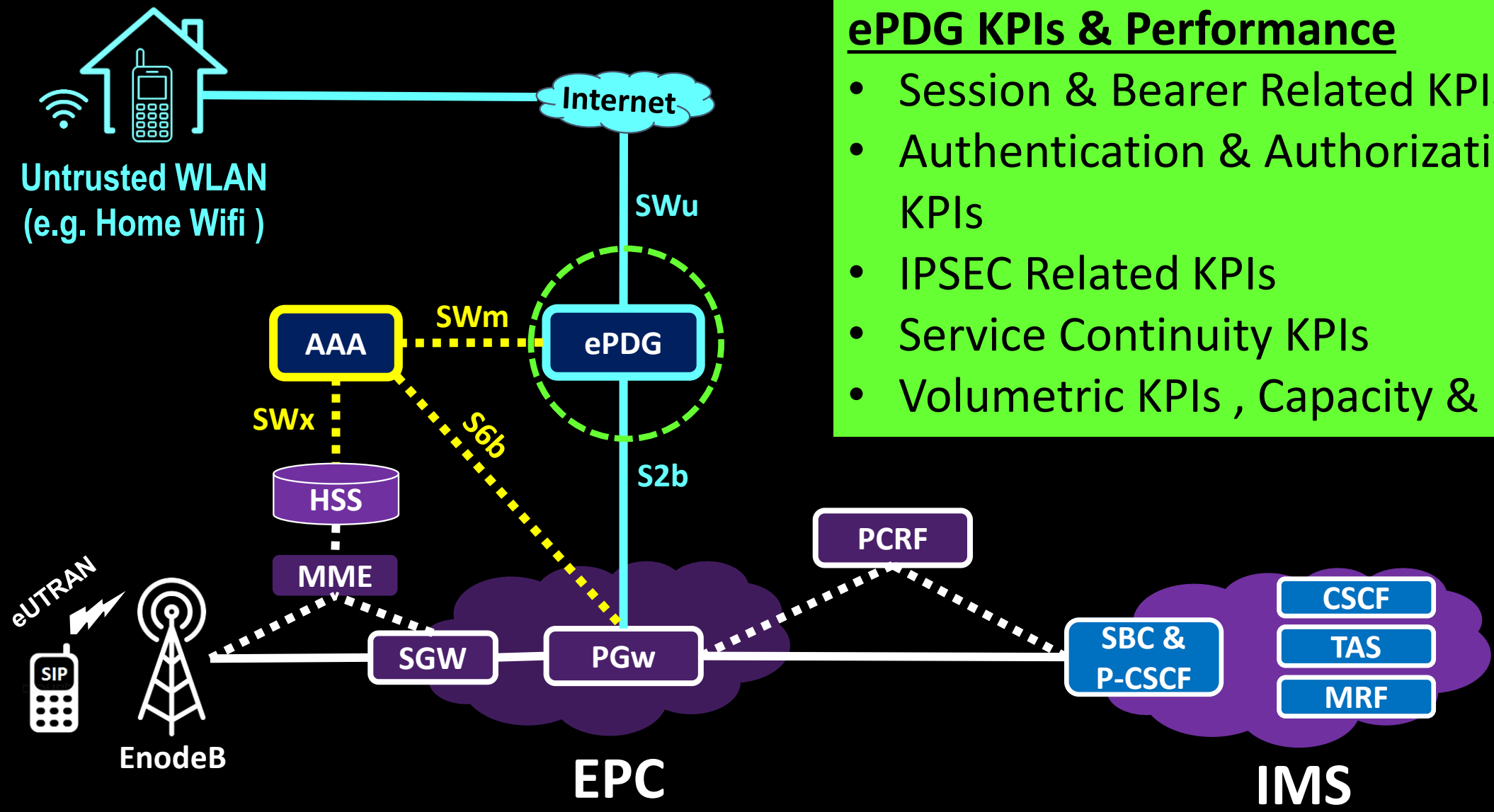
Up Next ..

Bonus Section on ePDG KPI & Performance

ePDG Basics – Performance & KPIs

3GPP TS 23.402



ePDG KPIs & Performance

- Session & Bearer Related KPIs
- Authentication & Authorization KPIs
- IPSEC Related KPIs
- Service Continuity KPIs
- Volumetric KPIs , Capacity & Utilz

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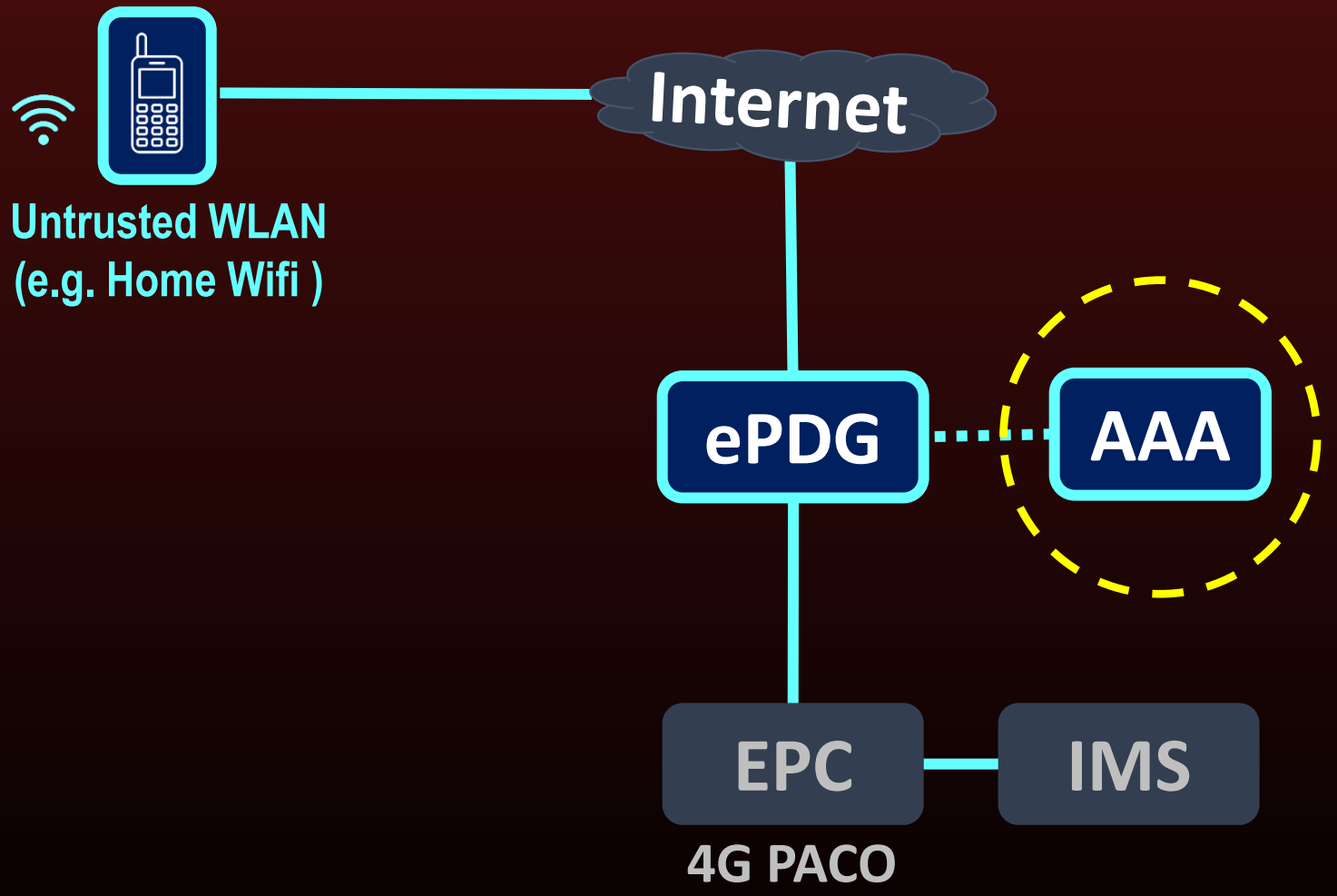
SECTION

3

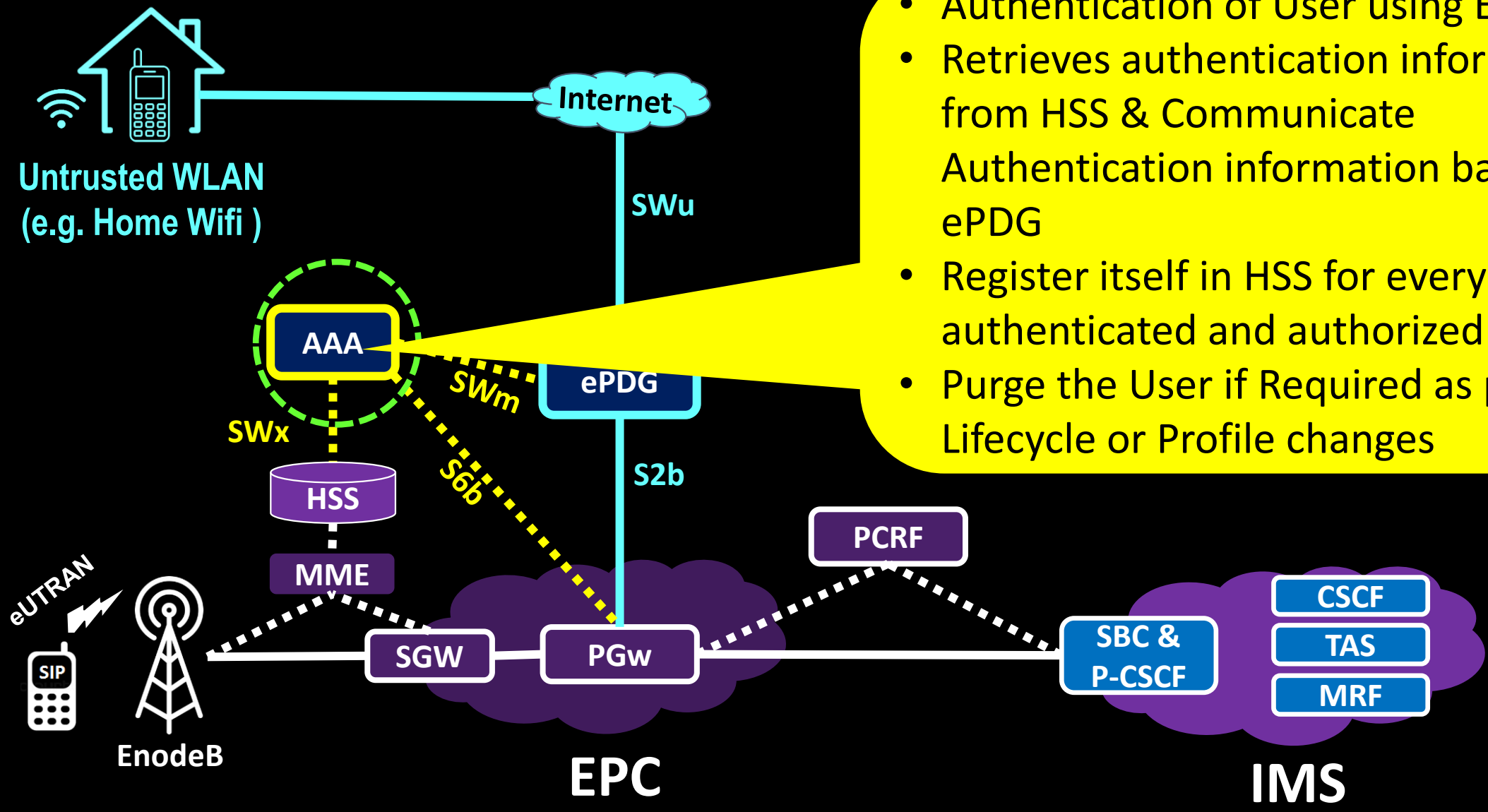
Role of AAA

Role of AAA - Untrusted WLAN



AAA Basics – Main Functions

3GPP TS 29.273



- Authentication of User using EAP-AKA
- Retrieves authentication information from HSS & Communicate Authentication information back to ePDG
- Register itself in HSS for every authenticated and authorized user
- Purge the User if Required as per Lifecycle or Profile changes

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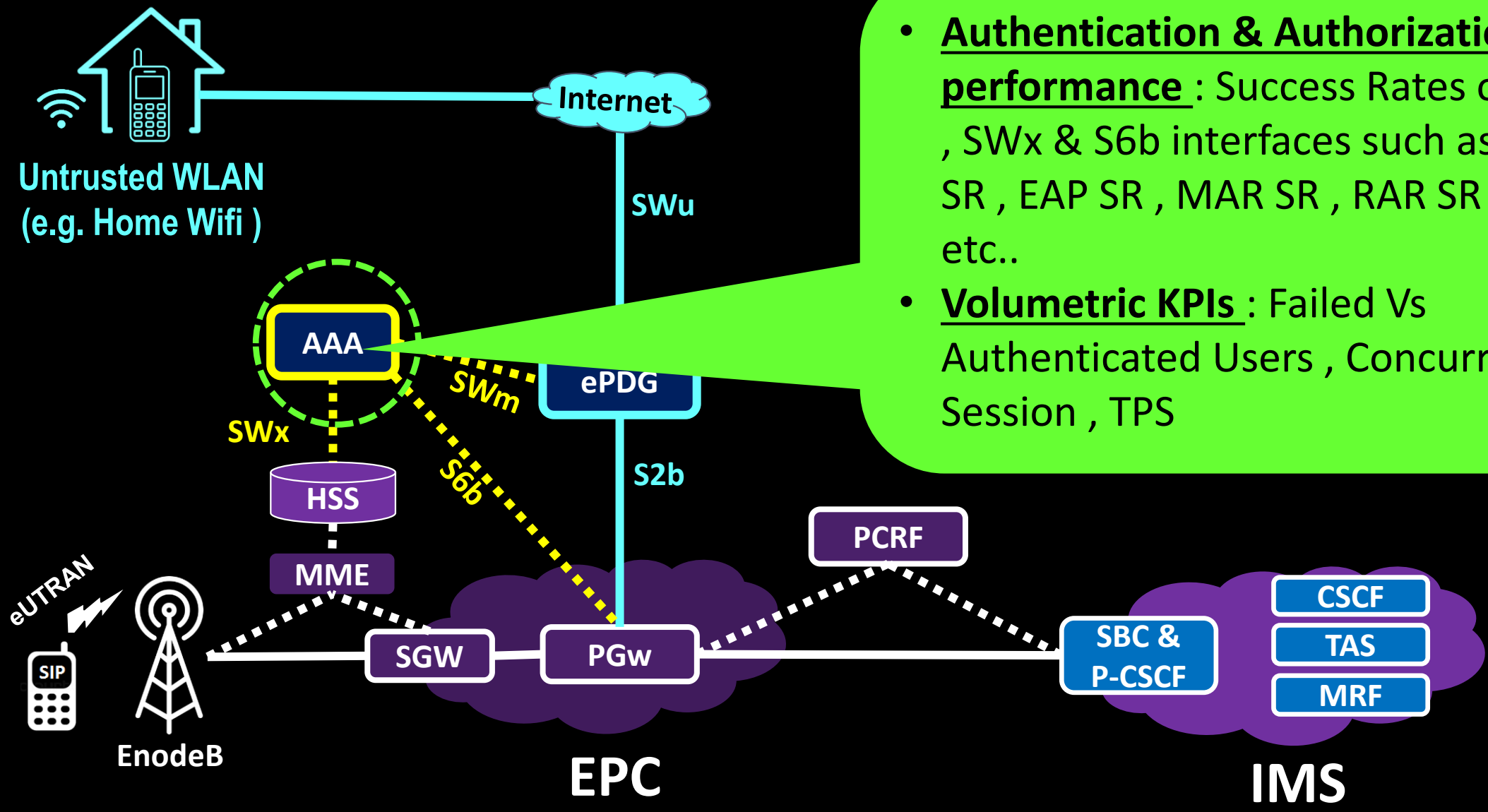
Up Next ..

Bonus Section on AAA KPI & Performance

AAA Basics – KPI & Performance

3GPP TS 29.273



- **Authentication & Authorization performance** : Success Rates on SWm , SWx & S6b interfaces such as AAR SR , EAP SR , MAR SR , RAR SR , STR SR etc..
- **Volumetric KPIs** : Failed Vs Authenticated Users , Concurrent Session , TPS

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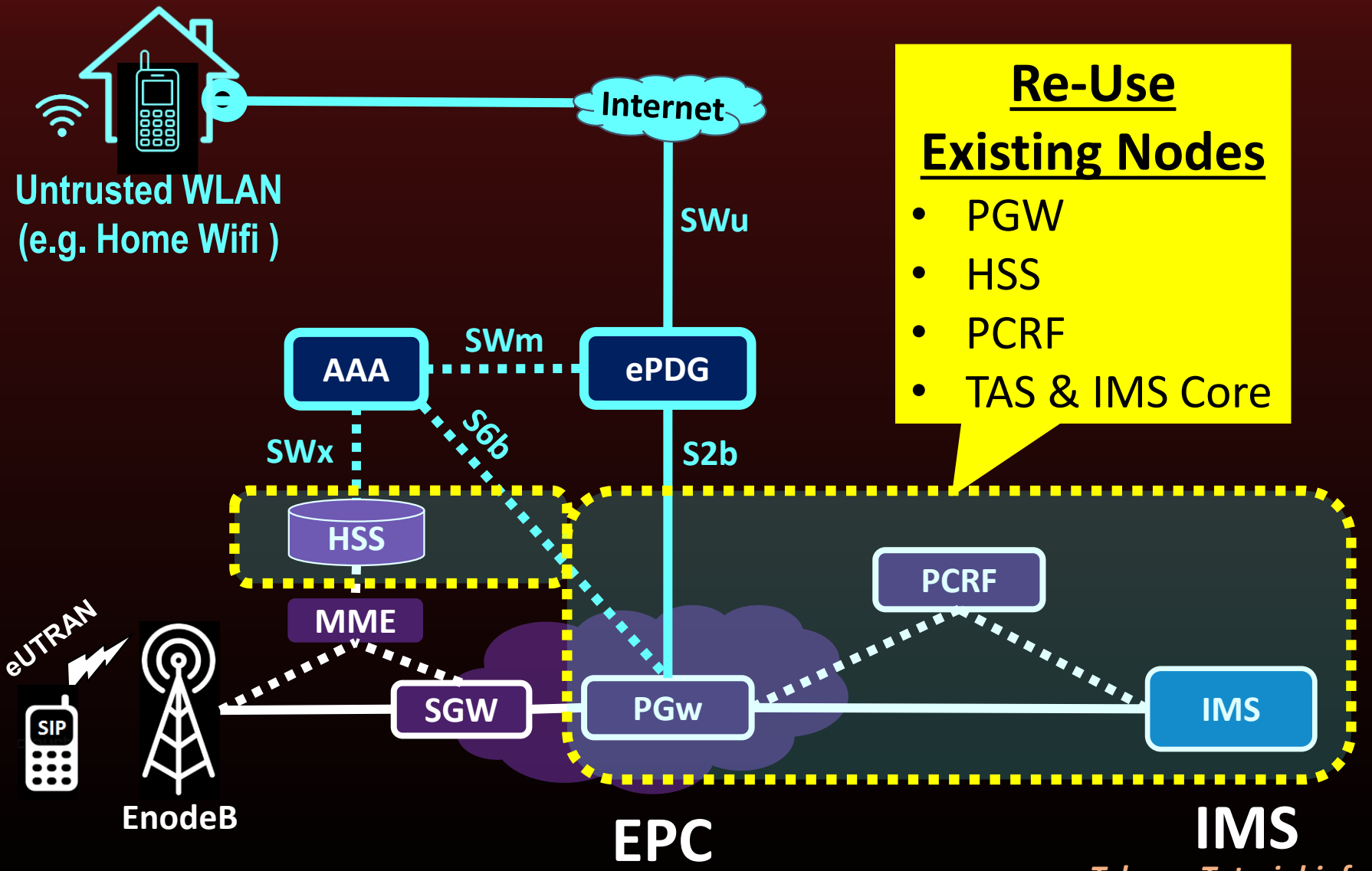
SECTION 4

Role of PGW , HSS , IMS , PCRF

Role of PGW , HSS , IMS , PCRF



Re-Use Existing Nodes

- PGW
- HSS
- PCRF
- TAS & IMS Core

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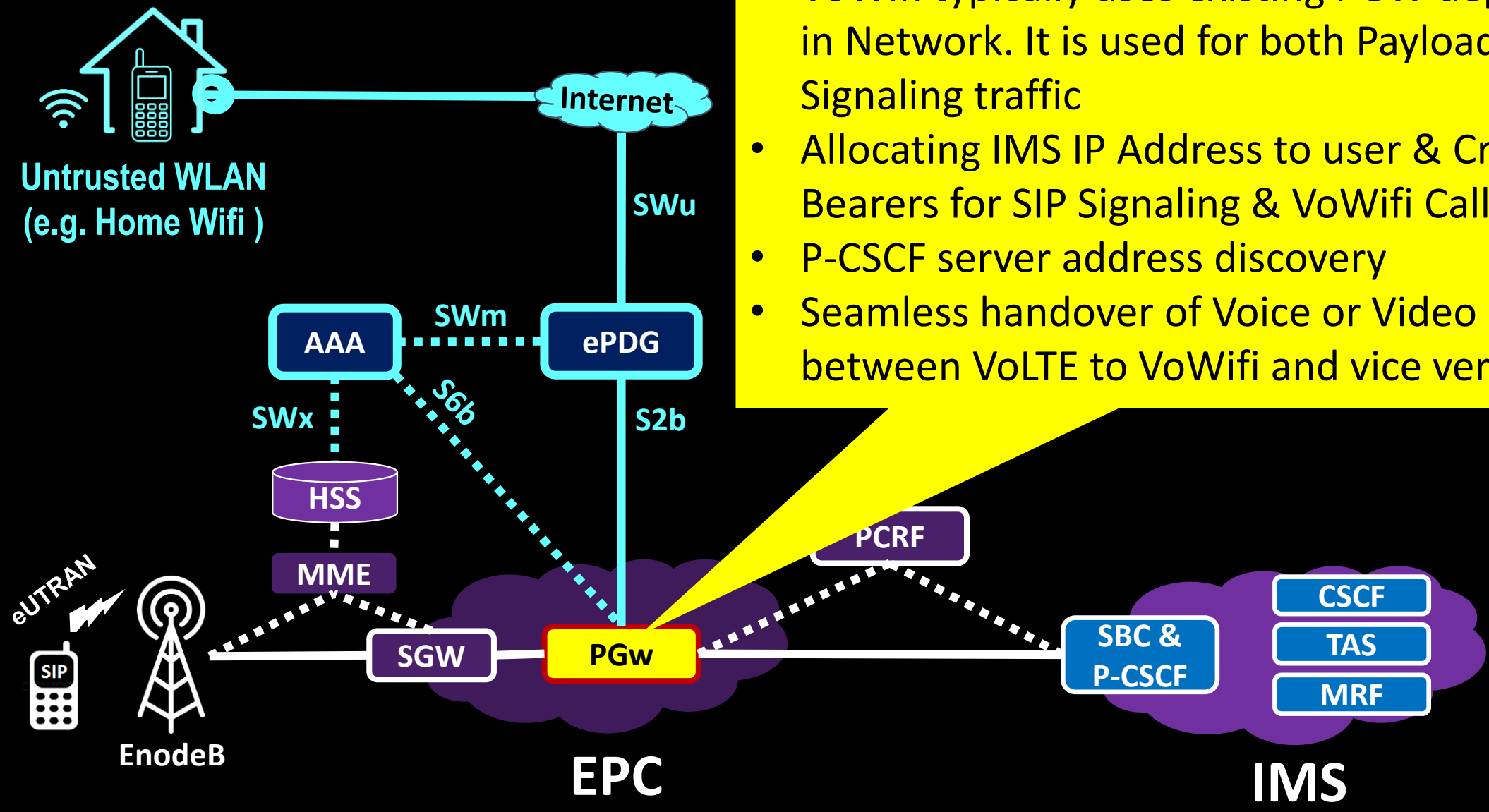
Role of PGW for VoWifi



Adaptations in PGW for VoWifi

- VoWifi typically uses existing PGW deployed in Network. It is used for both Payload & Signaling traffic
- Allocating IMS IP Address to user & Create Bearers for SIP Signaling & VoWifi Call
- P-CSCF server address discovery
- Seamless handover of Voice or Video calls between VoLTE to VoWifi and vice versa

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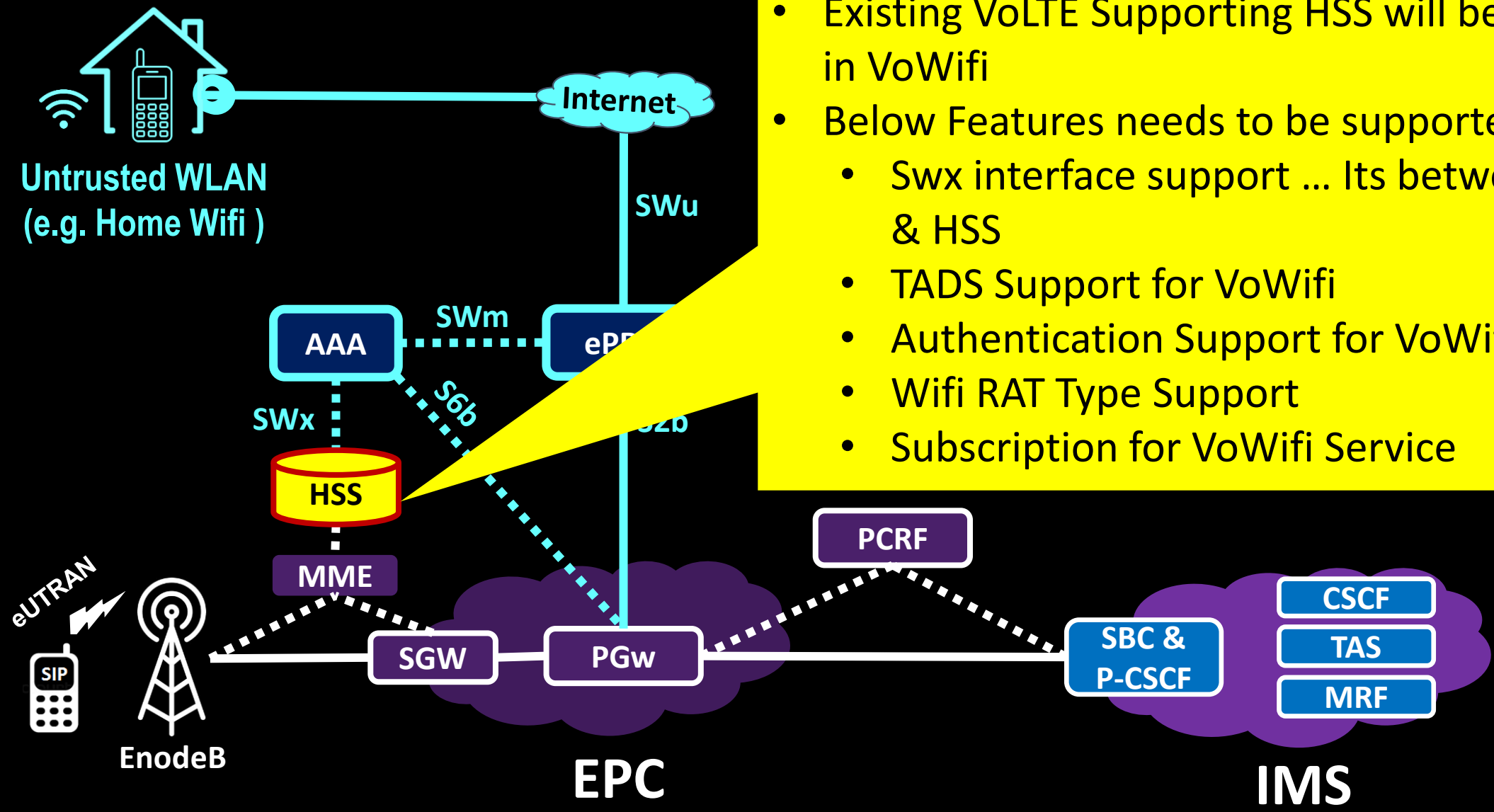
Role of HSS for VoWifi



Adaptations in HSS for VoWifi

- Existing VoLTE Supporting HSS will be Re-Used in VoWifi
- Below Features needs to be supported
  - Swx interface support … Its between AAA & HSS
  - TADS Support for VoWifi
  - Authentication Support for VoWifi
  - Wifi RAT Type Support
  - Subscription for VoWifi Service

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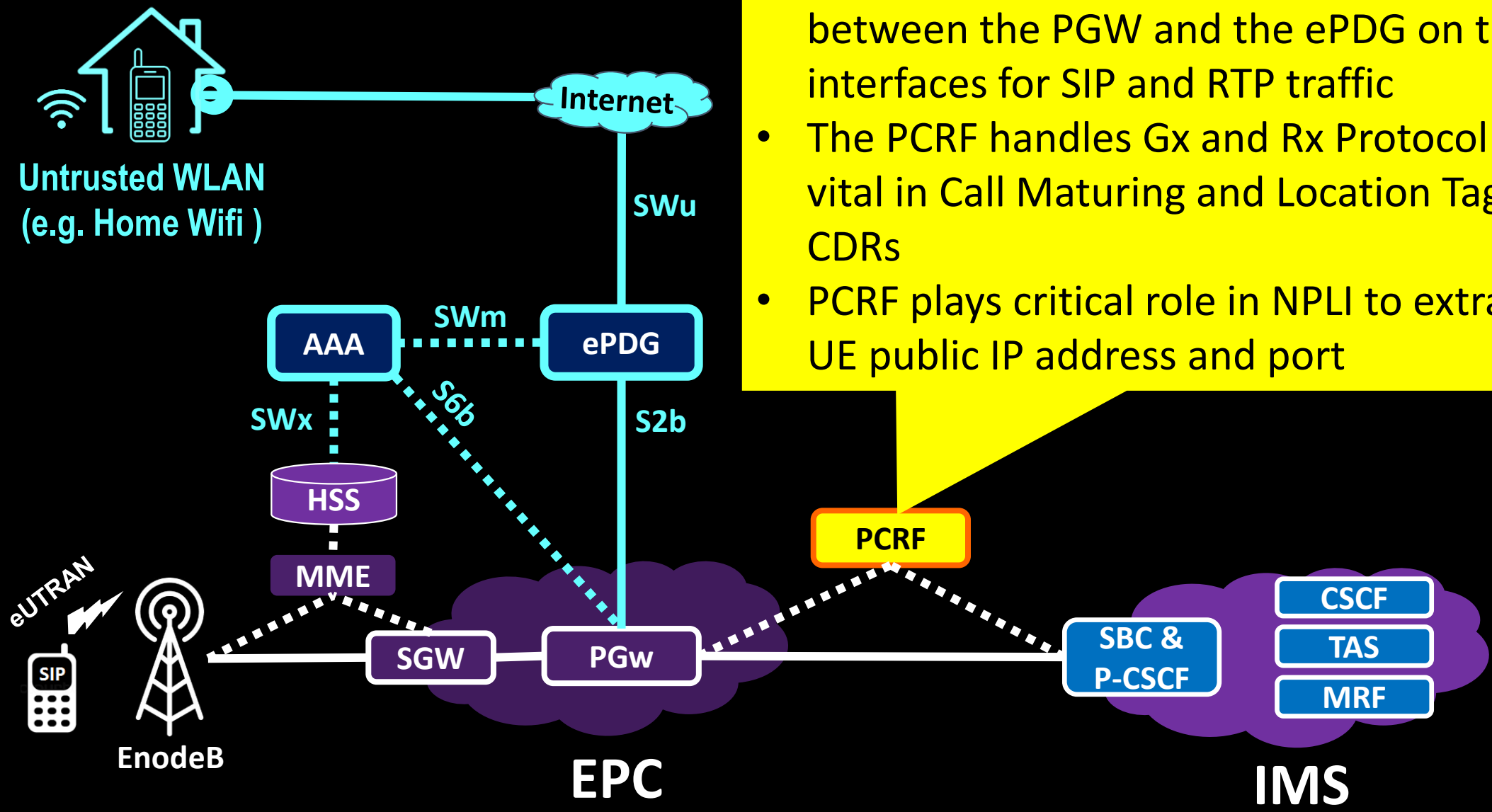
Role of PCRF in VoWifi



Adaptations in PCRF for VoWifi

- PCRF Set up default and dedicated bearers between the PGW and the ePDG on the S2b interfaces for SIP and RTP traffic
- The PCRF handles Gx and Rx Protocol which is vital in Call Maturing and Location Tagging in CDRs
- PCRF plays critical role in NPLI to extract the UE public IP address and port

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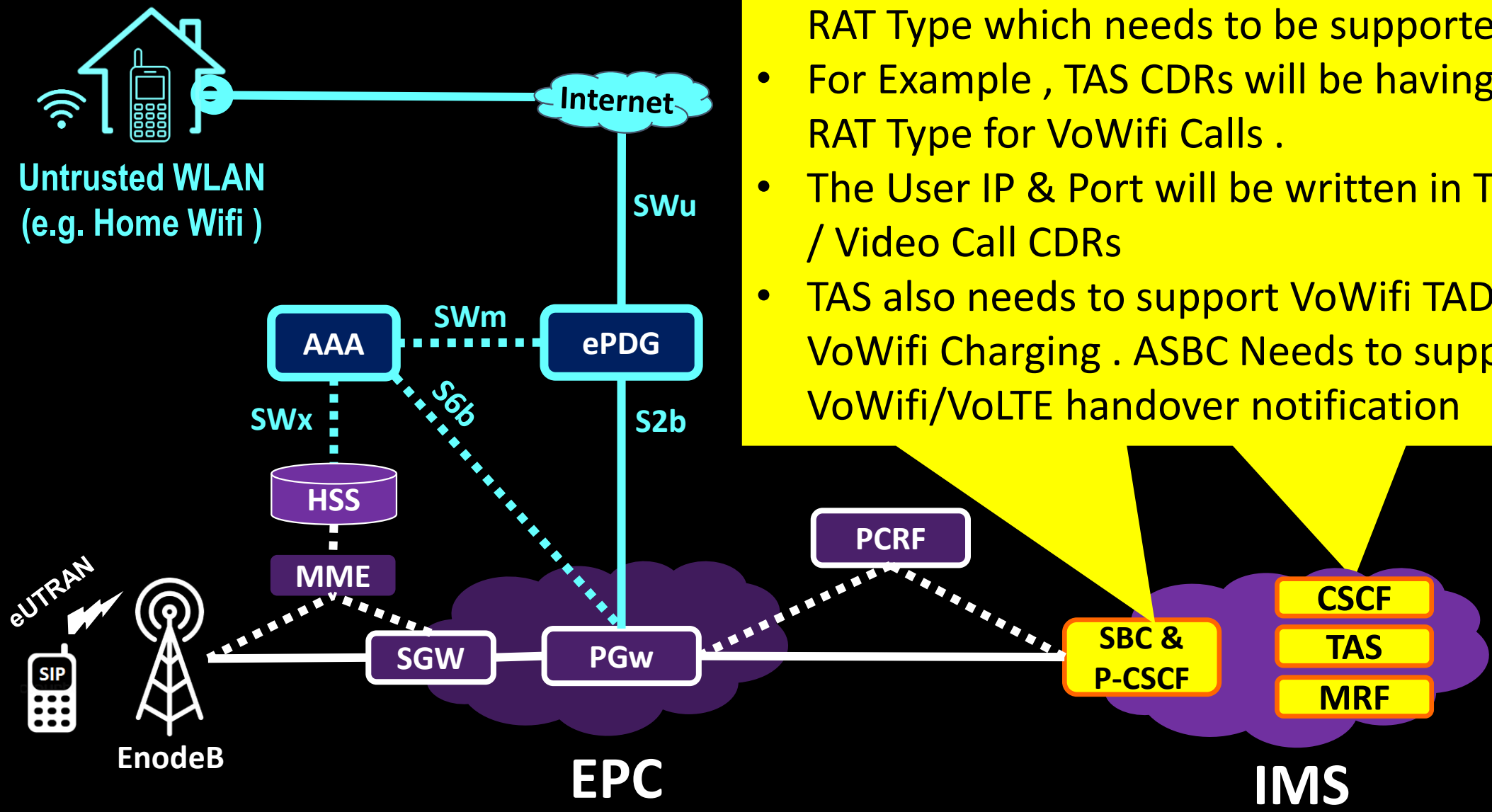
Role of IMS in VoWifi



Adaptations in IMS for VoWifi

- For IMS Network , The Wifi will come as new RAT Type which needs to be supported
- For Example , TAS CDRs will be having Wifi as RAT Type for VoWifi Calls .
- The User IP & Port will be written in TAS Voice / Video Call CDRs
- TAS also needs to support VoWifi TADS & VoWifi Charging . ASBC Needs to support VoWifi/VoLTE handover notification

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SECTION

5

VoWifi Experience

How to Improve Quality of VoWifi with Volumetric , CDRs & Analytics

Measure VoWifi user experience

VoWifi Node KPIs	VoWifi Subs Data	VoWifi Usage Data	VoLTE / VoWifi Per Subs Usage	VoWifi Other IMS KPIs
• ePDG KPIs • AAA KPIs • PGW KPIs • HSS KPIs • IMS – TAS , SBC KPIs • Utilization	• Unique Users • Total Users	• Total Traffic • Total Incoming MOUs • Total Outgoing MOUs	• mERL per Subs • Avg Call Duration • BHCA Per Subs	• RSR • Avg call setup time • Call Setup Success Rate • RTP Loss

Separate Metric for every Internet Service Provider or Wifi Provider or Broadband Provider

Key Metrics for VoWifi Customer Satisfaction + Business Metrics

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Summary

Re-Cap - Role of UE - Untrusted WLAN

UE Capabilities for Supporting VoWifi

- USIM / ISIM
- Hardware –Software Version
- Operator based Binary Profile , Authentication & Security

UE Tasks for VoWifi

1. Latching to Wifi Network
2. Discovering the ePDG using DNS
3. Establishing of IPSEC tunnel to ePDG
4. Performing SIP registration & make call

UE Decisions in VoWifi

- Default VoWifi Call (Y/N) ?
- VoLTE-VoWifi Handover Allowed (Y/N)?
- VoLTE / VoWifi thresholds on basis of Wifi performance – Wifi Signal , LTE Signal , Jitter / Packet loss / Packet Delay on Wifi Network

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Re-Cap - Role of ePDG - Untrusted WLAN

ePDG Tasks - PGW Side

- Landing point for traffic from Internet
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- Authentication & Authorization with AAA
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Considerations for ePDG

- Security & Privacy
- Service Parity
- Integration
- Network Integration & Deployment

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Re-Cap - Role of AAA - Untrusted WLAN

AAA Tasks

- Authentication of User using EAP-AKA & Retrieves authentication information from HSS .. Basically EPC access authentication and authorization on SWm & SWx Interfaces
- Retrieves Subscriber profile from HSS
- Updation & Retrieval of P-GW IP Address in HSS using S6b and Swx (Required for VoLTE & VoWifi Handovers)
- Communicate Authentication information back to ePDG
- In case Customer profile gets modified in HSS , The HSS Communicates same to AAA & further it is enforced to UE by ePDG
- Register itself in HSS for every authenticated and authorized user
- Purge the User if Required as per Lifecycle or Profile changes

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Future Reading & References

- **3GPP TS 23.402**
  - Architecture enhancements for non-3GPP accesses
  - Covers Complete Architecture in Detail such ePDG etc.. , important Document for enhancing knowledge on VoWifi

- **3GPP TS 29.273**
  - 3GPP EPS AAA interfaces
  - AAA Links , Descriptions , Format & Usage

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