



# Motivation for Enhancement to 5G Residence

Source: China Unicom, Huawei  
Agenda item: 4  
Document for: Discussion

# BACKGROUND: Smart Home - Worldwide

## Highlights:

- The Smart Home market worldwide is projected to generate a revenue of **US\$154.4bn** in 2024.
- According to forecasts, this market is expected to grow at an annual rate of **10.67%** (CAGR 2024-2028), resulting in a projected market volume of **US\$231.6bn** by 2028.
- In terms of household penetration, it is predicted to be **18.9%** in 2024 and is expected to increase to **33.2%** by 2028.
- Currently, the average revenue per installed Smart Home market is projected to be **US\$365.60**.

## Smart home - statistics & facts:

Smart homes use connected devices and appliances to perform actions, tasks, and automated routines to save money, time, and energy. Home automation systems allow for the integration of various smart devices and appliances controlled through a centralized system.

SMART HOME HOUSEHOLDS IN 2023  
360mn U.S. dollars

SMART HOME MARKET REVENUE IN 2023  
139mn U.S. dollars

SMART HOME PENETRATION RATE WORLDWIDE IN 2023  
16%



# Market trends in China and operators' pain points

- ❖ China's smart home market is experiencing rapid growth, driven by the increasing adoption of connected devices and the operators' strong push for advanced ToH services.
- ❖ The remote access, control and monitoring of individual devices is an essential component of intelligent home automation.

## Scenario #1: Home security (projected annual sale: 50M with CAGR 35%)

### Home care & security:

- Children
- Elderly
- pets



## Scenario #2: Remote access to home NAS (projected subscribers: 5M with 30% CAGR)

### Home network-attached storage devices (NAS)

access photos/music, download films, sync albums

### Home printer



## Scenario #3: Remote access to home/enterprise networks

### Remote access to files stored in PCs/Pads at

- home network
- enterprise network



### Pain point #1: weak security

#### Lack of E2E security guarantee →

- **Risk of privacy data breach**: user data has to go through a public cloud or a 3<sup>rd</sup> party network
- **Risk of tricksters and frauds**: data communication relies on NAT deployed by a 3<sup>rd</sup> party

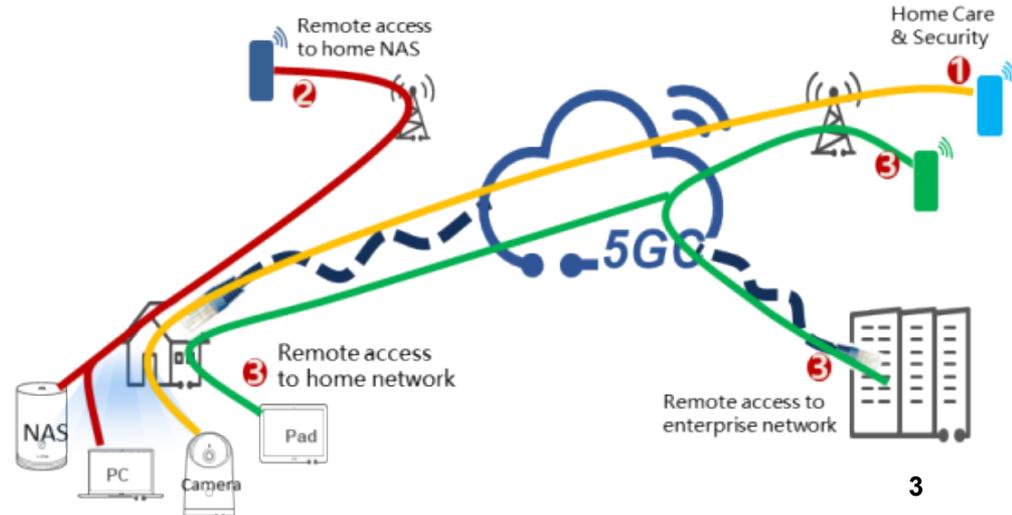
### Pain point #2: suboptimal user experience

#### Lack of E2E QoS guarantee →

- **No bandwidth guarantee**: potential data congestion in a public cloud or a 3<sup>rd</sup> party network
- **Low reliability**: potential issue with NAT deployed by a 3<sup>rd</sup> party

### Others:

- Potential high cost for operators with high OPEX (e.g. for both fixed access network and mobile network) and CAPEX (equipment such as RG and BS)
- Customers are reluctant to change their RGs



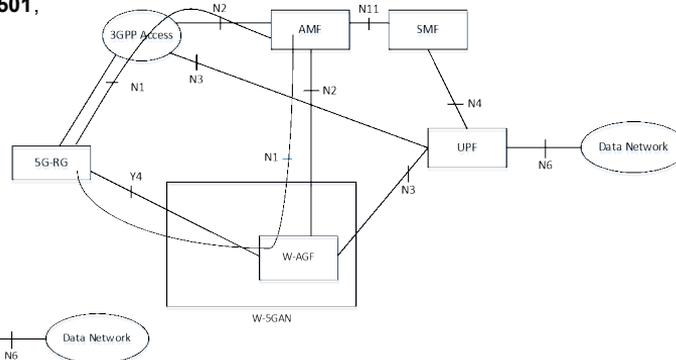
# Addressing the pain points with Smart Home

## What have been specified so far in SA2 ...

**5WWC** (Wireless and Wireline Convergence for the 5G system architecture): to specify “wireless and wireline convergence access support for the 5G System” in **TS 23.316**, as well as to enhance the 5GC specified in **TS 23.501**, **TS 23.502** and **TS 23.503**.

**5G-RG**: a RG capable of connecting to 5GC playing the role of a **UE** with regard to the 5GC.

R16 →



**FN-RG**: a RG that it does not support N1 signaling and it is **not 5GC capable**.

W-5GAN

## What requirements we have specified so far in SA1 ...

**PIRates** (Personal IoT and Residential networks): defined service requirements for

- Creation, provisioning and management of local networks and management of entities within these networks
- Service and UE/ device discovery within a Customer Premises or Personal IoT network
- Interactions between UEs / devices / applications within a Personal IoT or Customer Premises network and with UEs and/or services / applications in the cellular network.
- ...

**TS 22.261** Clause 6.38 Personal IoT Networks and Customer Premises Networks

**TS 22.101** Clause 26a User Identity

R18

## Gap analysis ...

- **Reality** – most RGs have no USIM
- R16 onwards, SA2 has defined
  - 5G-RG has to be a UE;
  - FN-RG is not 5GC capable;
  - W-AGF is required for both RGs.
- SA1 Rel-18 work focused on the 5G system support for UEs/devices behind an eRG. However,
  - PRAS cannot always be assumed in some markets for various reasons;
  - The service requirements for the 5G system to support eRG are limited.
  - Limited discussions on the practical issues, e.g. how a RG (typically with no USIM) can access 5G networks and services

## Potential enhancement in support of ever-growing smart home market, e.g.

Better support of the RGs (typically with no USIM) to access 5G networks and services

Enhanced security support

# Rel-20 proposal options

**Option #1:** SI – to allow SA1 to thoroughly study the use cases, especially describing practical issues, in order to identify the additional requirements

Potential SID with the following objectives -

The objective of this study is to identify use cases, provide a gap analysis and define potential enhancement requirements for the residential gateway (without USIM) to access 5G networks and 5G services via non-3GPP access, including

- Authentication and authorization aspects;

- Identification of the residential gateway (without USIM);

- Other aspects.

**Option #2:** miniWID – for SA1 to specify only the key additional requirements, leaving technical details to stage-2 WGs

Potential CR to TS 22.261:

- to clarify the authentication and authorization requirement for the residential gateway (without USIM);

***Thank you***