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Your Extensible Software Defined Radio

## **YesDR Technical Specification**

### **YesDR TS 02.004**

Version 1.0.0

Release 1

## **YesDR Unified Data Management (YUDM)**

### **Developed by**

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## 1 Scope

This Technical Specification defines the YesDR Unified Data Management (YUDM) function.

YUDM provides subscriber data storage, authentication vector generation, and identity management services for the YesDR core network.

YUDM is conceptually aligned with the 3GPP UDM defined in TS 23.502 and TS 29.503, with simplified interfaces suitable for research and SDR-based deployments.

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## 2 References

### 2.1 Normative References

- YesDR TS 01.001: YesDR Overall Architecture
- YesDR TS 02.001: YesDR Core Network Functions

### 2.2 Informative References

- 3GPP TS 23.502: Procedures for the 5G System
- 3GPP TS 29.503: Unified Data Management Services
- 3GPP TS 33.501: Security Architecture

## 3 Definitions, Symbols, and Abbreviations

Abbreviation	Description
YUDM	YesDR Unified Data Management
YAMF	YesDR Access Management Function
YAUSF	YesDR Authentication Server Function
YNRF	YesDR Network Repository Function
SUPI	Subscription Permanent Identifier
SUCI	Subscription Concealed Identifier
GUTI	Globally Unique Temporary Identifier
IMSI	International Mobile Subscriber Identity

## 4 Functional Overview

The YUDM stores and manages subscriber-related information required for:

- UE authentication and key derivation
- Subscriber identity management
- Subscription data access
- Sequence number (SQN) management

YUDM SHALL expose service-based interfaces over HTTP/2.

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## 5 YUDM Architecture

YUDM consists of the following internal components:

- Subscriber Data Store (e.g., MongoDB)
- Authentication Vector Generator (Milenage)
- Key Derivation Function (KDF)
- NRF Registration and Heartbeat Client

YUDM SHALL register itself with YNRF and maintain liveness using heartbeat messages.

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## 6 Subscriber Data Model

YUDM SHALL store the following subscriber attributes:

Field	Description
IMSI	Permanent subscriber identity
K	Subscriber secret key
OP	Operator variant algorithm configuration field
AMF	Authentication management field
SQN	Sequence number maintained by home network

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## 7 Service-Based Interfaces

### 7.1 Nudm\_UEAuthentication

YUDM SHALL support authentication data generation as requested by YAUSF.

#### 7.1.1 Nudm\_UEAuthentication\_Get

**HTTP Method:** POST

**URI:** /get-auth-vector

**Input Parameters:**

- SUCI or GUTI
- Serving Network Name (SNname)
- AUTS (optional)

**Output Parameters:**

- RAND
- AUTN
- XRES\*
- KAUSF
- SUPI

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## 8 Authentication Vector Generation

YUDM SHALL generate authentication vectors using the Milenage algorithm.

The following steps SHALL be performed:

1. Retrieve subscriber credentials
2. Generate RAND
3. Compute AUTN, RES, CK, IK
4. Derive KAUSF and XRES\*
5. Update SQN

AUTS-based resynchronization SHALL be supported.

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## 9 Security Considerations

YUDM SHALL:

- Protect subscriber data at rest
- Use secure transport (HTTPS)
- Validate authentication requests

Unauthorized access to YUDM services SHALL be rejected.

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## 10 Error Handling

YUDM SHALL return appropriate error responses for:

- Unknown subscriber
- Authentication failure
- Invalid AUTS
- Internal processing errors

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## 11 Relationship to 3GPP UDM

YUDM aligns with 3GPP UDM functionality while:

- Using simplified service APIs
- Supporting SDR-focused deployments
- Enabling experimentation and AI integration

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