



Your Extensible Software Defined Radio

YesDR Technical Specification

YesDR TS 04.001

Version 1.0.0

Release 1

YesDR Access Control Protocol (YACP)

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1 Scope

This Technical Specification defines the YesDR Access Control Protocol (YACP). YACP provides control-plane signaling between the YesDR Base Station (YBS) and the YesDR Access Management Function (YAMF).

YACP is conceptually aligned with the NG Application Protocol (NGAP) defined in 3GPP TS 38.413.

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 38.413: NG Application Protocol (NGAP)
- 3GPP TS 23.501: System Architecture for the 5G System

3 Definitions, Symbols, and Abbreviations

| Abbreviation | Description |
|--------------|--------------------------------------|
| YACP | YesDR Access Control Protocol |
| YBS | YesDR Base Station |
| YAMF | YesDR Access Management Function |
| YUE | YesDR User Equipment |
| NAS | Non-Access Stratum |
| IE | Information Element |
| PLMN | Public Land Mobile Network |
| GUTI | Globally Unique Temporary Identifier |

4 Protocol Overview

YACP is a reliable control-plane protocol operating between YBS and YAMF.

YACP SHALL:

- Transport NAS messages transparently
- Establish and manage UE contexts
- Support radio resource coordination
- Support PDU session control signaling

Messages SHALL be encoded using a TLV-based format.

5 YACP Message Categories

- Interface Management
- Radio Resource Management
- UE Context Management
- NAS Transport
- Security Procedures
- PDU Session Management

6 Interface Management Procedures

6.1 YACPSetupRequest

Message Type: 0x06

| IE | Type | Description |
|--------------|------|-------------------------|
| GlobalNodeID | 0x20 | PLMN ID and Node ID |
| NodeName | 0x21 | Human-readable YBS name |

6.2 YACPSetupResponse

Message Type: 0x07

| | | |
|----------------------|------|-------------------------------|
| YAMFName | 0x30 | Serving YAMF name |
| ServedGUAMIList | 0x31 | Supported GUAMI list |
| RelativeYAMFCapacity | 0x32 | Relative capacity |
| PLMNSupportList | 0x33 | Supported PLMN and slice list |

7 Radio Resource Management

7.1 RadioResourceRequest

Message Type: 0x08

| | | |
|---------|------|--------------------|
| ybs_id | 0x40 | YBS identifier |
| plmn_id | 0x40 | PLMN identifier |
| tac | 0x40 | Tracking Area Code |

7.2 RadioResourceResponse

Message Type: 0x09

| | | |
|---------------|------|---------------------|
| yamf_id | 0x41 | YAMF identifier |
| bandwidth_mhz | 0x41 | Allocated bandwidth |
| frequency_mhz | 0x41 | Allocated frequency |
| power_dbm | 0x41 | Power level |

8 NAS Transport Procedures

8.1 NASRegistrationRequest

Message Type: 0x10

| | | |
|-------------------------|------|--------------------------|
| RAN-UE-NGAP-ID | 0x55 | RAN UE identifier |
| NAS-PDU | 0x26 | NAS registration message |
| UserLocationInformation | 0x79 | UE location info |
| RRCEstablishmentCause | 0x5A | Establishment cause |
| AMFSetID | 0x03 | AMF set identifier |
| UEContextRequest | 0x70 | UE Context Request Flag |

8.2 DownlinkNASTransport

Message Type: 0x29

| | | |
|----------------|------|------------------------|
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |
| NAS-PDU | 0x26 | Authentication Request |

8.3 UplinkNASTransport

Message Type: 0x2A

| | | |
|----------------|------|-------------------------|
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |
| NAS-PDU | 0x26 | Authentication Response |

8.4 NASSecurityModeCommand

Message Type: 0x11

| | | |
|---------------------|------|-------------------------|
| SecurityAlgorithms | 0x60 | Security Algorithms |
| NASMessageContainer | 0x55 | NAS Encrypted Container |
| GUTI | guti | GUTI |

8.5 NASSecurityModeComplete

Message Type: 0x12

| | | |
|---------------------------|------|-------------------------------------|
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |
| IMEISV | 0x70 | IMEISV |
| EAPMessage | 0x71 | EAP Message |
| AdditionalSecCapabilities | 0x72 | Additional UE Security Capabilities |

8.6 NASRegistrationAccept

Message Type: 0x13

| | | |
|--------------------|------|----------------------------------|
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |
| TAList | 0x80 | Tracking Area Identity List |
| DRXParameters | 0x82 | Discontinuous Reception Settings |
| RegistrationStatus | 0x83 | Registration Status |

9 Radio Resource Management

9.1 IdentityRequest

Message Type: 0x28

| | | |
|----------------|------|--------------------------|
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |
| NAS-PDU | 0x26 | Identity Request NAS PDU |

9.2 Identity Response

Message Type: 0x30

| | | |
|--------------------------|------|--------------------------|
| UE Identity | 0x50 | UE identity |
| UE Security Capabilities | 0x51 | UE security capabilities |
| Requested NSSAI | 0x52 | SST + SD |
| PLMN ID | 0x53 | PLMN |
| Serving Network Name | 0x54 | Serving network name |
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |

10 PDU Session Resource Procedures

10.1 PDUSessionResourceSetupRequest

Message Type: 0x20

| | | |
|------------------------|------|--------------------|
| AMF-UE-NGAP-ID | 0x0A | AMF UE ID |
| RAN-UE-NGAP-ID | 0x55 | RAN UE ID |
| GUTI | 0x62 | UE identity |
| TEID | 0x66 | Tunnel endpoint ID |
| PDUSessionResourceList | 0x4A | PDU session list |

10.2 PDUSessionResourceSetupResponse

Message Type: 0x21

| | | |
|-------------------------------------|------|---------------------|
| PDUSessionResourceListSetupResponse | 0x4B | Setup response list |
| gtp_ip | 0x4B | GTP IP address |
| gtp_teid | 0x4B | GTP TEID |
| ue_ip | 0x4B | UE IP address |