

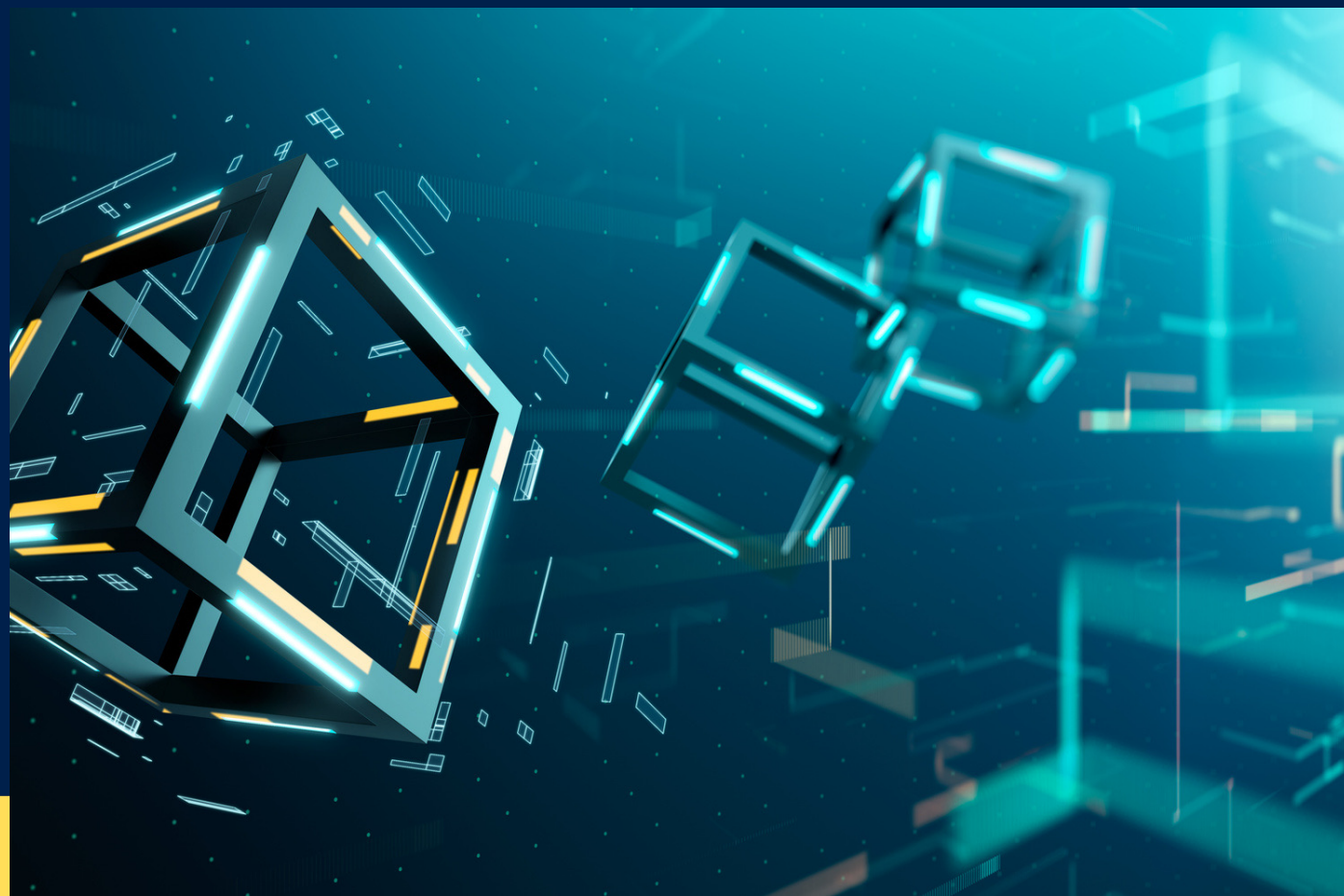


5G HÁLÓZATOK KIBERBIZTONSÁGA

-

**SPECIÁLIS TÁMADÁSOK ÉS
SPECIÁLIS VÉDELMI MEGOLDÁSOK**

MIBEN KÜLÖNBÖZIK AZ 5G A KORÁBBI GENERÁCIÓKTÓL?



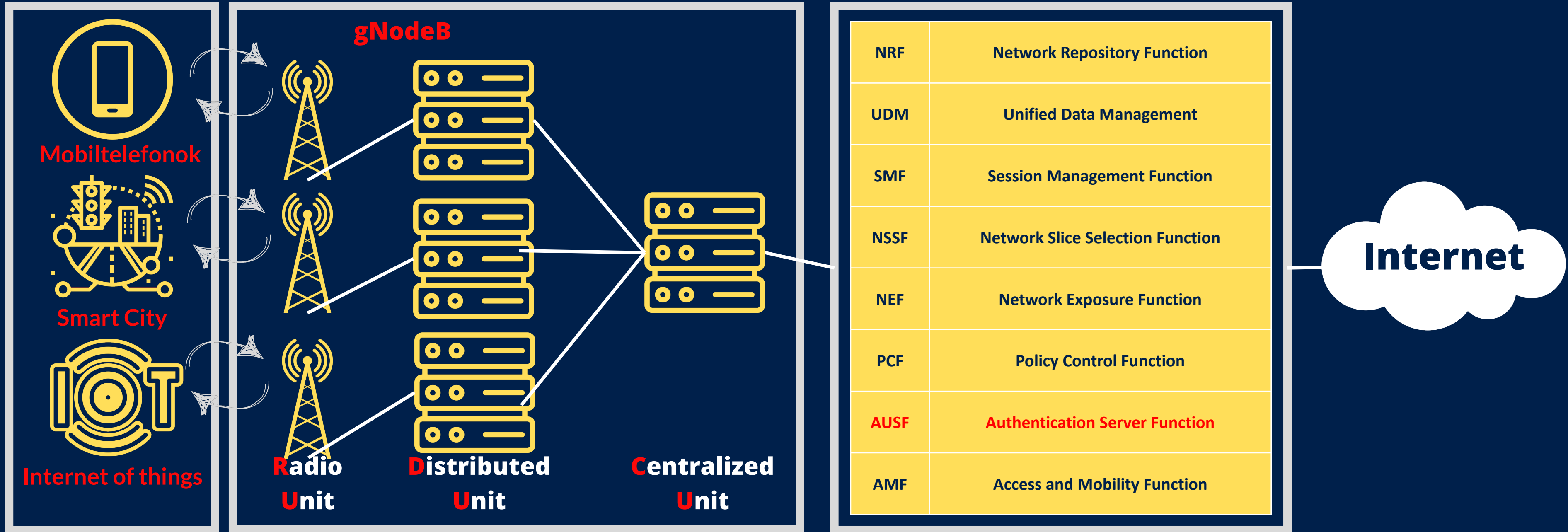
	4G	5G	
Késleltetés	Kb. 60 – 80 ms	> 5 ms	15 Δ
Elméletileg elérhető sávszélesség	1 Gbps	10 Gbps	10 Δ
Hálózati kapacitás	Kb 200 – 400 felhasználó/cella	100x 4G 😊	100 Δ

5G SA (StandAlone) Architecture

**User
Equipment**

**RAN
(Radio Access Network)**

**CN
(Core Network)**



RU:

- Error-free data transmission
- Beamforming
- Massive MIMO

DU:

- Direct Data Handling
- Timing
- Security

CU:

- Radio Resource Management
- Data Processing
- Mobility Management

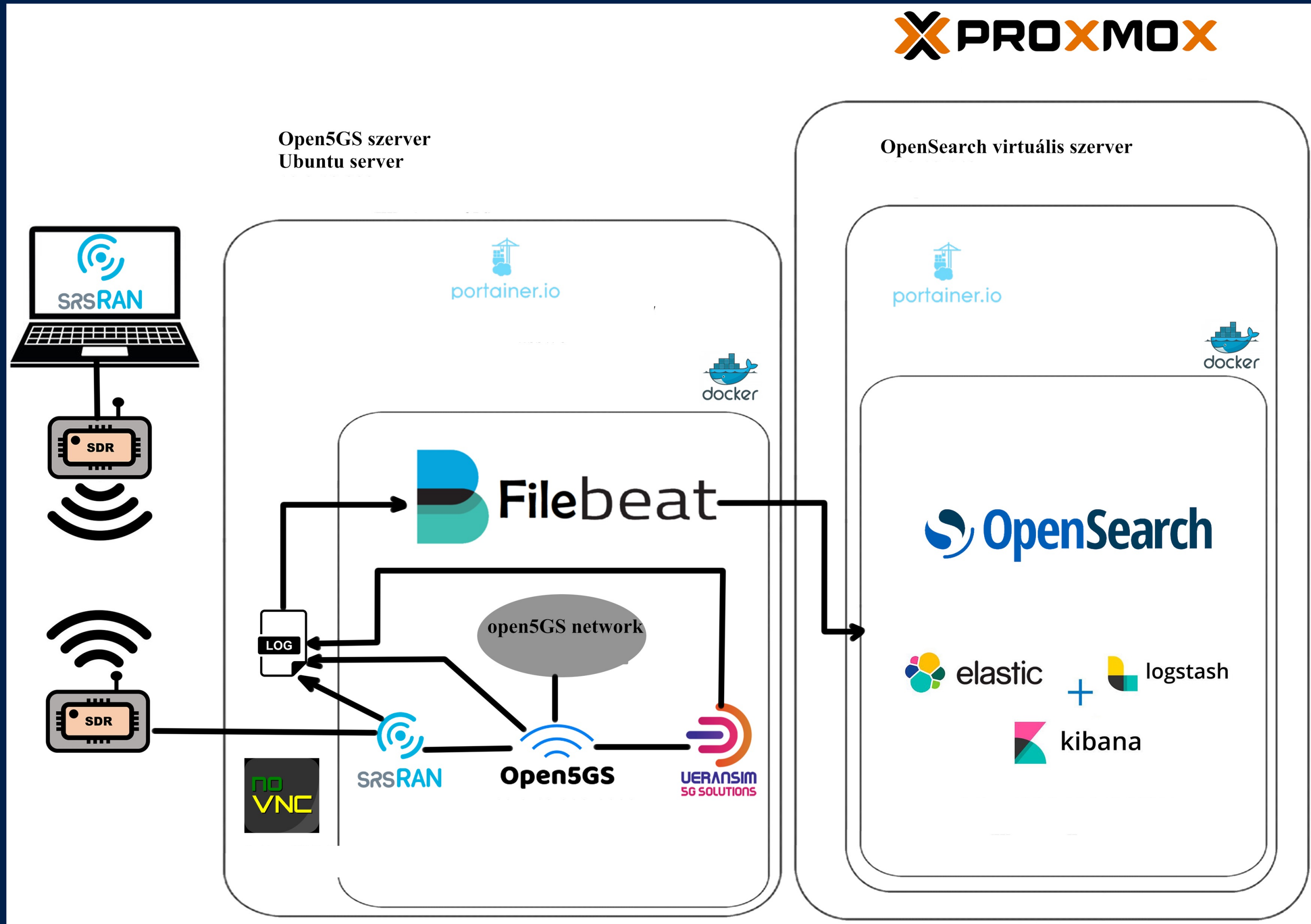
A SAJÁT 5G HÁLÓZATUNK

Milyen
applikációk
legyenek?

Hibrid
környezet?

Naplóadatok /
Hálózati adatok
forrása?

Security
Operaton Center



Csatlakozás az 5G-s hálózatra, regisztráció

Regisztrációs folyamat, az eszköz és a maghálózat között.



Miért is kell a regisztrációs folyamat?

Feliratkozó azonosítása és autentikációja :

**Azonosító – IMSI (International Mobile
Subscriber Identity)**

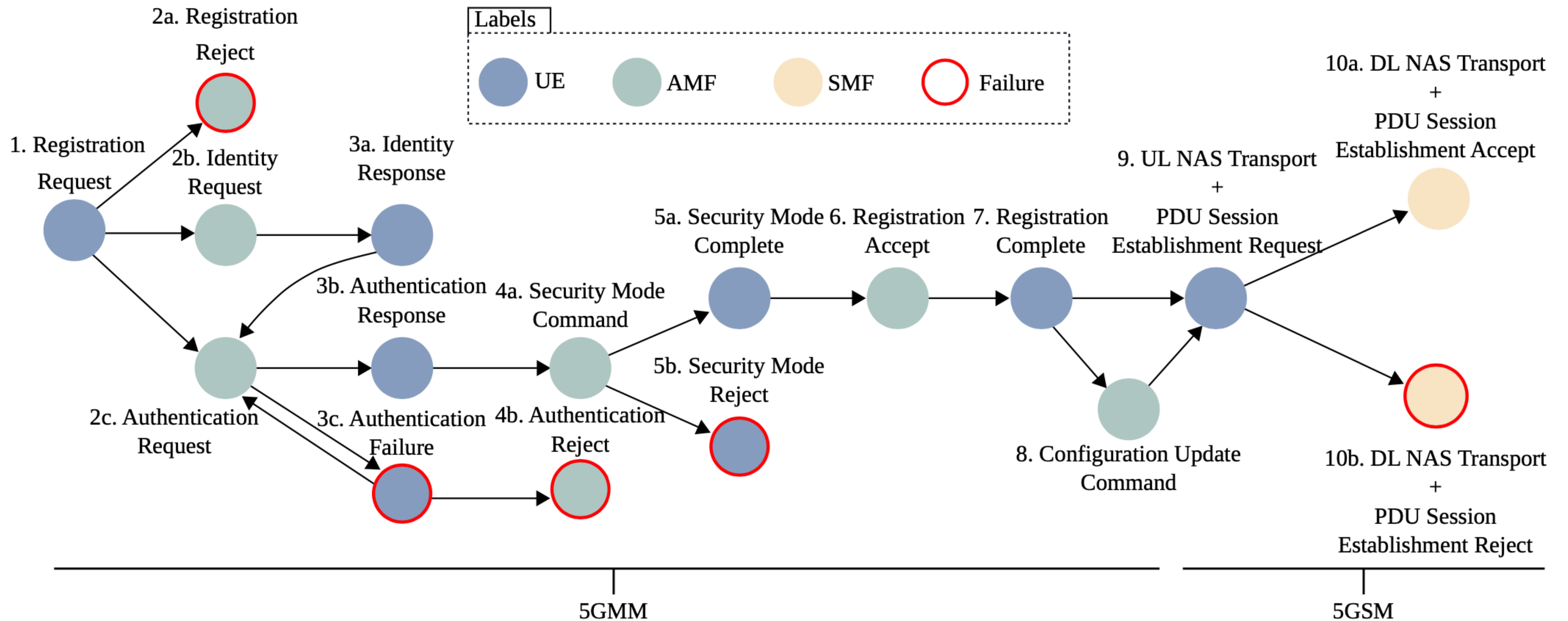
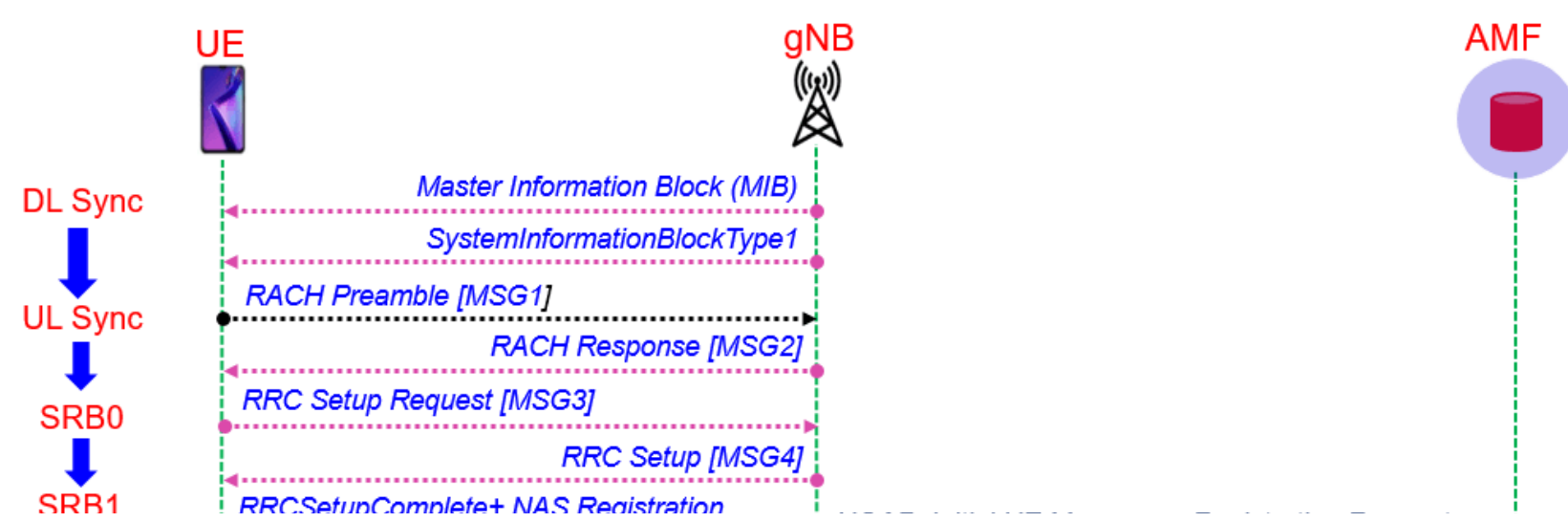
IMSI Catching

Biztonság és titoktartás :

Biztonságos és védett kapcsolat



REGISZTRÁCIÓS FOLYAMAT



KOMPONENS LOGOK

Time ▾	Info ✕ »	Category	Component	Severity
> Jun 9, 2022 @ 23:25:31.000	Deregister from NRF successfully	=Init	UDM	info
> Jun 9, 2022 @ 23:25:31.000	UDM terminated	=Init	UDM	info
> Jun 9, 2022 @ 23:25:31.000	Deregister from NRF successfully	=Init	NSSF	info
> Jun 9, 2022 @ 23:25:31.000	NSSF terminated	=Init	NSSF	info
> Jun 9, 2022 @ 23:25:31.000	Deregister from NRF successfully	=Init	SMF	info
> Jun 9, 2022 @ 23:25:31.000	Deregister from NRF successfully	=Init	AUSF	info
> Jun 9, 2022 @ 23:25:31.000	AUSF terminated	=Init	AUSF	info
> Jun 9, 2022 @ 23:25:31.000	Deregister from NRF successfully	=Init	UDR	info
> Jun 9, 2022 @ 23:25:31.000	UDR terminated	=Init	UDR	info
> Jun 9, 2022 @ 23:25:31.000	[PCF] Handle Amf Status Change Notify is not implemented.	=Callback	PCF	warning
> Jun 9, 2022 @ 23:25:31.000	204 127.0.0.1 POST /npcf-callback/v1/amfstatus	=GIN	PCF	info
> Jun 9, 2022 @ 23:25:31.000	Deregister from NRF successfully	=Init	PCF	info
> Jun 9, 2022 @ 23:25:31.000	PCF terminated	=Init	PCF	info
> Jun 9, 2022 @ 23:25:30.000	Terminating UDM...	=Init	UDM	info
> Jun 9, 2022 @ 23:25:30.000	Send Deregister NFInstance	=Consumer	UDM	info

FORGALMI ADATOK

No.	Tim					
>	Aug 29, 2023 @ 09:53:19.783	10.0.0.10	10.0.0.1	NGAP	InitialContextSetupResponse	
>	Aug 29, 2023 @ 09:53:19.783	10.0.0.1	10.0.0.10	SCTP	SACK	
>	Aug 29, 2023 @ 09:53:19.745	10.0.0.10	10.0.0.1	NGAP	UERadioCapabilityInfoIndication	
>	Aug 29, 2023 @ 09:53:19.723	10.0.0.1	10.0.0.10	NGAP/NAS-5GS	InitialContextSetupRequest	
>	Aug 29, 2023 @ 09:53:19.712	10.0.0.10	10.0.0.1	NGAP/NAS-5GS	UplinkNASTransport	
>	Aug 29, 2023 @ 09:53:19.633	10.0.0.10	10.0.0.1	SCTP	SACK	
>	Aug 29, 2023 @ 09:53:19.432	10.0.0.1	10.0.0.10	NGAP/NAS-5GS	DownlinkNASTransport	
>	Aug 29, 2023 @ 09:53:19.431	10.0.0.10	10.0.0.1	NGAP/NAS-5GS	UplinkNASTransport	
>	Aug 29, 2023 @ 09:53:19.422	10.0.0.1	10.0.0.10	NGAP/NAS-5GS	DownlinkNASTransport	
>	Aug 29, 2023 @ 09:53:19.417	10.0.0.10	10.0.0.1	NGAP/NAS-5GS	InitialUEMessage	
>	Aug 29, 2023 @ 09:53:17.120	10.0.0.10	10.0.0.1	SCTP	HEARTBEAT_ACK	
>	Aug 29, 2023 @ 09:53:17.119	10.0.0.1	10.0.0.10	SCTP	⊕ ⊖ HEARTBEAT	

FORGAI

```
INFO : INITIALIZING ...
"layers": {
  "sctp": {
    "s": "ngap_ngap_NAS_PDU": "7e:01",
    "s": "2:00",
    "s": "per_per_sequence_of_length",
    "s": "ngap_ngap_protocolIEs": ":",
    "s": "per_per_extension_present",
    "t": "ngap_ngap_fiveG_TMSI": "cf",
    "s": "e212_e212_mcc": [
    "s": "101",
    "s": "101"
    ],
    "ngap_ngap_tac": "153",
    "per_per_extension_bit": false,
    "ngap_ngap_protocolIE_fields": [
    "s": null,
    "s": null,
    "s": null,
    "s": null,
    "s": null,
    "s": null,
    ],
    "per_per_enum_index": "4",
    "ngap_ngap_value_element": [
    "s": null,
    "s": null,
    "s": null,
    "s": null,
    "s": null
    ],
  },
},
```

```
Item 2: id-1
Item 3: id-1
Item 4: id-1
```

```
],
```

```
    "frame": {
      "frame frame offset shift": "0 00000000",
    },
    "in": {
    },
  ],
  "nas-5gs": {
    "nas-5gs_nas_5gs_msg_auth_code": "0x1617e6b0",
    "nas-5gs_nas_5gs_seq_no": "5",
    "text": [
      "Security protected NAS 5GS message",
      "Encrypted data"
    ],
    "nas-5gs_nas_5gs_epd": "126",
    "nas-5gs_nas_5gs_spare_half_octet": "0",
    "nas-5gs_nas_5gs_security_header_type": "1"
  },
  "ngap_ngap_aMFP_pointer": "00",
  "per_per_octet_string_length": "44",
  "ngap_ngap_procedure_code": "15",
  "per_per_optional_field_bit": false,
  "ngap_ngap_plmn_identity": "01:f1:01",
  "ngap_ngap_id": [
    "85",
    "38",
    "121",
    "90",
    "26"
  ],
  "ngap_ngap_rrc_establishment_cause": "4",
  "ngap_ngap_user_location_information": "1"
},
},
```

```
1:40:02:02:00:50:02:0
```

TÁMADÁS ELEMZÉS

>	Jun 9, 2022 @ 23:16:41.205	35540 → 27017 [ACK] Seq=48709	-		TCP	-
>	Jun 9, 2022 @ 23:25:31.000		-		Deregister from NRF successfully	
>	Jun 9, 2022 @ 23:25:31.000		-		UDM terminated	
>	Jun 9, 2022 @ 23:25:31.000		-		Deregister from NRF successfully	
>	Jun 9, 2022 @ 23:25:31.000		-		NSSF terminated	
>	Jun 9, 2022 @ 23:25:31.000		-		Deregister from NRF successfully	
>	Jun 9, 2022 @ 23:25:31.000		-		Deregister from NRF successfully	
>	Jun 9, 2022 @ 23:25:31.000		-		AUSF terminated	
>	Jun 9, 2022 @ 23:25:31.000		-	⊕ ⊖	Deregister from NRF successfully	
>	Jun 9, 2022 @ 23:25:31.000		-		UDR terminated	
>	Jun 9, 2022 @ 23:16:40.941	39132 → 8000 [FIN, ACK] Seq=140 Ack=277 Win=65536 Len=0 TSva1=3709037690 TSecr=3529765875	-		TCP	-

OPENSEARCH DASHBOARD

Uplink NAS Transport (RAN UE NGAP ID: 2)" amf_ue_ngap_id="AMF_UE_NGAP_ID:2
Deregister from NRF successfully
urilist update
Create NF Profile
set report call : false set log level : info
NFDiscoveryProcedure err: RestfulAPIGetMany err: (BadValue) \$and/\$or/\$nor must be a nonempty array

Handle NFDiscoveryRequest

| 500 | 127.0.0.1 | GET | /nnrf-disc/v1/nf-instances?requester-nf-type=&target-nf-type= |

Server started
Handle NFDeregisterRequest
Handle NFRegisterRequest
Handle QueryAmData Send Deregister NFInstance
Uplink NAS Transport (RAN UE NGAP ID: 1)" amf_ue_ngap_id="AMF_UE_NGAP_ID:1

RIASZTÁSOK

GNU nano 4.8

```
name: DOS Rule
type: frequency
index: filebeat_elastalert*
num_events: 100
timeframe:
  minutes: 5
```



Opensearch_Elastalert_Webhook 24/10 6:15 pm

DOS Rule

Több mint 100 darab HTTP protokoll csomag érkezett, 2023-10-24T16:14:52.266Z-kor erről az IP címről:127.0.0.1

← Válasz

alert:

- "ms_teams"

ms_teams_alert_summary: Alert

ms_teams_theme_color: '#ff0000'

ms_teams_webhook_url: 'https://obudaiegyetem.webhook.office.com/webhookb2/24591b76-7e25-4691-89ca-

run_every:

minutes: 1

buffer_time:

minutes: 15



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NATIONAL RESEARCH, DEVELOPMENT
AND INNOVATION OFFICE
HUNGARY

PROJECT
FINANCED FROM
THE NRDI FUND

InfoLab research –

5G and Cyber security, eGovernment/AI

- 5G NR RI vulnerability and protocol analysis
- Real Time Vulnerability Information Management – Risk Assessment
- Internet Survey - Identification of hacked web pages/devices
- Security certification of IoT devices
- Secure Communication – Block chain
- AI based eGovernment and administrative AI solutions
- National Data Assets
- Safe Digital Society Innovation Cluster





Looking for partners

Horizon Europe –
tenders / projects

Conferences –
presentations

Discussions -
sharing of
results /
informations



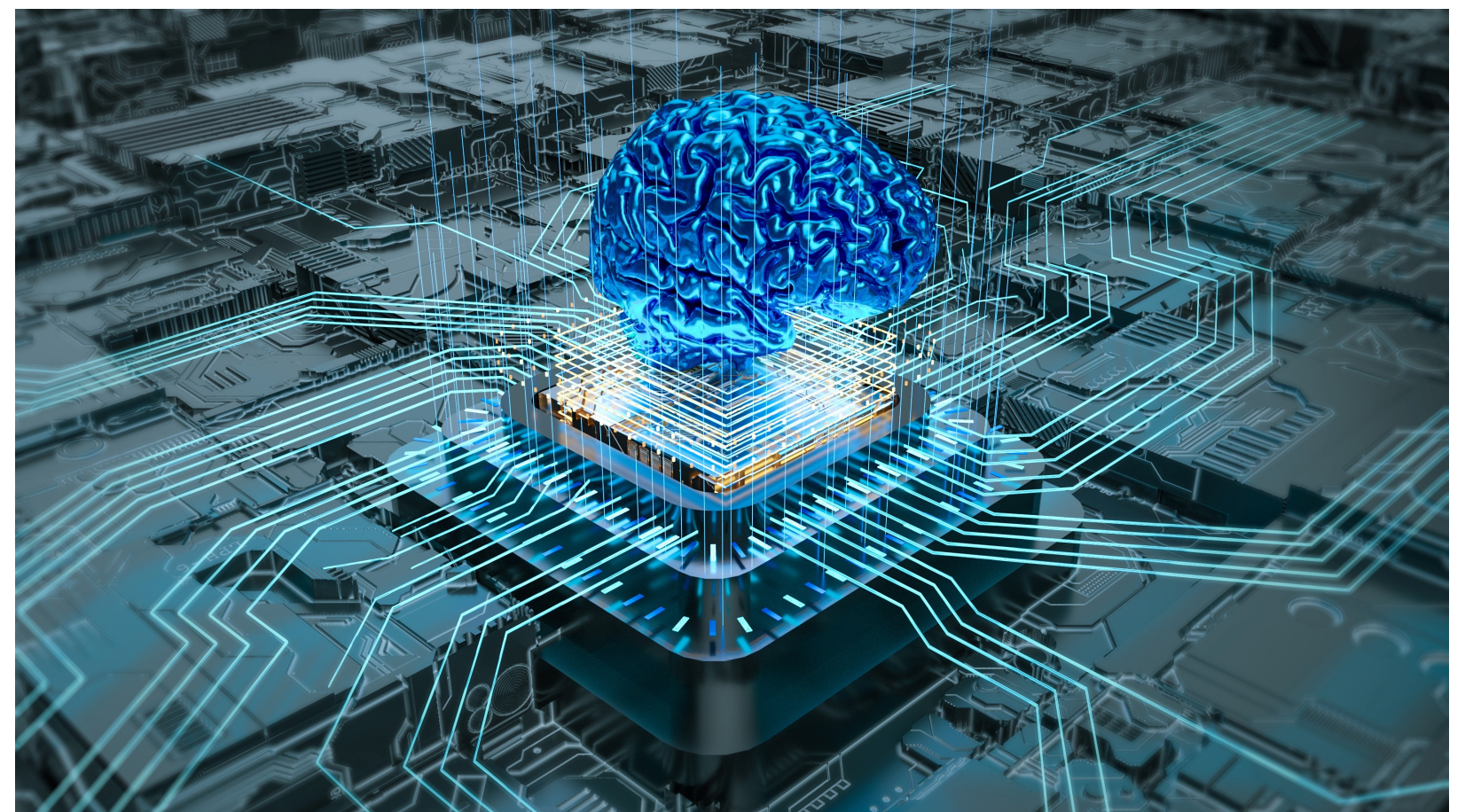
To ease safely the everyday life in the future



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Information Technology
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THANK YOU!!!