Standalone
a kulcs az 5G alkalmazásokhoz
5G Standalone - Agenda

- Technical advantages
- Best Practices
- Monetization
- Q&A
5G Standalone
Technical advantages

Diagram showing options for 5G EPC + 5GC:
- Option 1: LTE
- Option 2: LTE/NR
- Option 3: NR
Enhanced end-user experience
With NR Standalone

Faster connect with RRC inactive
- Down from 150 ms to 25 ms idle to connect time
- End-user will perceive as always connected

Instant access to large bandwidth
- Up from 20MHz to 100 MHz
- Augmented with Carrier Aggregation and Dual Connectivity

6x faster to connect
5x higher throughput

Max throughput from idle
FR1-FR2 DC
Initial access
CA

FR1
FR2 DC

SA NSA LTE
Initial access

Max throughput from idle
25 150 ms
Latency

Latency in SA is more stable. In NSA anchor mobility procedures (NR leg release/re-establish) cause latency.

% of packets | MBB | From best effort to bounded latency | URLLC | X ranges from tens of ms to 1ms latency
% reliability (likelihood) | Y% reliability (likelihood)
(1-Y)% late or lost packets | X ms | Y ranges from 99% to 99,999% reliability

SA enables Time-Critical Communication

![Ping Latency Distribution](image)

![Average Ping RTT vs SS-RSRP](image)
Coverage

- In SA mode there is naturally no dependence on any anchor carrier
- With Carrier Aggregation 700-3500, the 3500 DL performance becomes completely independent of the uplink on TDD-Midband
Energy Efficiency with Massive MIMO

Massive live event in European capital city July 2022 – High Load

Consumed Energy per Band

- Low Band FDD
- LTE Mid Band FDD
- LTE Mid Band TDD
- 5G Mid Band TDD

Measured Energy Efficiency in Live Network

- 52 Wh/GB
- 4 Wh/GB

Downlink Traffic per Band

- LTE800_FDD
- 5G700_FDD
- LTE1800_FDD
- LTE2100_FDD
- LTE2600_FDD
- LTE3500_TD
- 5G3500_TDD

In a high load situation, 5G TDD + MMIMO has proven to be more energy efficient:
- 13x better than LTE FDD
In a low load situation, 5G TDD + MMIMO has proven to be more energy efficient: - 6.5x better than LTE FDD.
5G Standalone
Monetization
Network and Device ecosystem readiness

111 Operators investing in public 5G Standalone

Total: 66 SA mobile platform chipsets and 844 SA commercial devices, Aug/22

- **66 SA mobile platform chipsets**
- **844 SA commercial devices**

**Commercially available 5G devices with 5G SA support, by form factor**
- **Smartphones:** 71%
- **FWA CPE:** 11%
- **Industrial CPE/router/gateway/modem:** 4%
- **Battery-operated hot spot:** 1%
- **Other 4%**

**Sub-6GHz supported by band, announced 5G SA devices, most-supported bands**
- n78: 726
- n41: 699
- n1: 612
- n77: 581
- n3: 514
- n28: 514
- n79: 487
- n5: 484
- n8: 384
- n7: 343

Source: GSA 5G SA report August 2022
Device ecosystem: URSP 2.0 support
(User equipment route selection policies)

Up to Max 8 Slices/PDUs for a User Equipment

Android 13 available for Pixel smartphones users since August 15th
Coming for other flagship devices, such as Samsung, Oppo, Motorola, Xiaomi
CSPs are preparing for differentiated offerings

- **eMBB Real-time**
- **eMBB Premium**
- **eMBB Economy**

### Industrial 5G territory
- **eMBB Fixed Wireless Access**

### Mixed 5G territory
- **Network Slicing**
- **Multiple slices for same UE**
- **Standalone**
- **Mid Band TDD**

### Residential 5G territory
- **Time-Critical Industry**

- **Mira**
  - Enterprise Subscription
  - Private 5G Subscription

- **Jenny**
  - Gaming Subscription
  - Private 5G Subscription

- **Bary**
  - Private 5G Subscription
  - Mixed 5G territory

- **Multiple subscription and Multi-Pay based on Service differentiation enabled by:**
  - Network Slicing
  - Multiple slices for same UE
  - Standalone
  - Mid Band TDD
Monetize 5G for smartphones
5G Narrative in a nutshell

<table>
<thead>
<tr>
<th>From monthly subscription</th>
<th>To Multi-subscriptions, Multi-pay &amp; “5G as a platform”</th>
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<tbody>
<tr>
<td><strong>MBB logic</strong></td>
<td></td>
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<tr>
<td>20€/month for 30GB/month</td>
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<tr>
<td>With optional bundled services and content</td>
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<tr>
<td>Data Volume Tiering</td>
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<tr>
<td>Premium subscription</td>
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<tr>
<td>✓ Working from Home Schools</td>
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<td>✓ On field workers</td>
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<tr>
<td>✓ ASL remote health check</td>
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<tr>
<td>Economy subscription</td>
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<tr>
<td>✓ Most of today MBB subscriptions</td>
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<tr>
<td>All connections are equally treated</td>
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</tbody>
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**Beyond MBB logic**

- Google
  - 5G slicing is one of the key areas of innovations that will let CSPs earn a return on their investments in 5G, by offering a secure and dynamic network platform to enterprises.

- B2B2X
  - Offer Premium Subscription to App developers, OTTs who, in turn, offer it to their customers through Apps (premium App)

- B2B2B
  - Offer Premium Subscriptions to App developers, HCPs for their customers (es 5G Private Network services based on edge computing)

**Different types of connections**
Subscriber, Service and Performance differentiation
Current & future opportunities for 5G value creation

- **Enterprise**: Industrial grade private networks, API monetization, 5G campus, Wireless WAN Edge, 5G venues, XR (AR/VR/Haptics), Digital twins, Immersive experiences, XR Gaming
- **Consumer**: Mobile gaming, FWA, eMBB, Wide-area IoT, Mission critical
- **Current adjacencies**: Private networks, Core connectivity, Future innovation

Source: 5G value creation executive deck sprint deliverable March 2022
Best Practices
Ericsson 5G standalone networks

- **Canada, Rogers**: Initial focus on eMBB
- **USA, T-Mobile**: Initial focus on eMBB
- **Colombia, DirecTV**: Focus on FWA
- **Brazil, Claro, TIM, Vivo**: Initial focus on eMBB, B2B
- **Germany, Vodafone**: Initial focus on eMBB
- **China**: Initial focus on eMBB, B2B
- **South Korea, KT**: Initial focus on eMBB, B2B
- **Japan, Softbank, KDDI**: Initial focus on B2B, FWA, then eMBB
- **Singapore, Singtel**: Initial focus on eMBB, FWA and B2B
- **India, Jio**: Initial focus on eMBB and FWA
- **Australia, Optus**: Initial focus on eMBB and B2B
- **Australia, Telstra**: Initial focus on B2B, then eMBB
- **Canada, Xplornet**: Initial focus on FWA
- **Italy**: Focus on FWA
- **Canada, Rogers**: Initial focus on eMBB
- **Brazil, Claro, TIM, Vivo**: Initial focus on eMBB, B2B
- **Australia, Optus**: Initial focus on eMBB and B2B
- **Australia, Telstra**: Initial focus on B2B, then eMBB
- **NSA/SA**: SA only
- **SA only**: 2x
- **eMBB**: eMBB, FWA and B2B initial drivers for Standalone
First Standalone network using commercial network slice for Formula 1

Singapore Formula 1 Circuit park map

5G SA Users streaming F1 race over the CAST app.

E2E Network Slicing + NR Radio Resource Partitioning

- New network slice defined network-wide (E2E)
- NR RRP configured for sites serving F1 event area
- Subscribers with Singtel CAST Sports plus package provisioned to access new network slice
- NR RRP to ensure protection for prioritized subscribers with Singtel CAST sports plus package

For illustration only

Default Slice 1-NUL (existing)

Event Slice 1-1 (new)
Network Slice use cases

- **Telstra 5G SA services for enterprises**
  Fully automated 5G network slicing with orchestration capability in a commercial network.

- **F1 with immersive experiences**
  Vodafone UL dedicated slice for Retail/Manufacturing with AR/VR Slicing for business customers.
  Vodafone Business customers can reserve such a ‘slice’ of capacity for their own essential business processes.

- **5G Smart Patrol Vehicle**
  Taiwan’s FarEastTone uses 5G to help Kaohsiung police find stolen cars with network slicing including Radio Resource Partitioning.

- **RTL Deutschland live video production**
  Journalists broadcast live TV reports via 5G standalone with network slicing solution.

- **AGV with immersive 360 Video B2B**
  Telefónica and Ericsson network slicing including Radio Resource Partitioning.

- **DNB Malaysia**
  DNB nationwide deployment 5G network with Radio Resource Partitioning for SA and NSA.
Summary – Why 5G Standalone

Unique benefits vs NSA

Some unique features supported in SA only

- Network Slicing
- Support > 2 NR carriers
- UL CA* and UL SU MIMO
- Inactive state
- VoNR

Better Network efficiency

- LTE offload
- More time on 5G
- Less HO interruption time
- Instant access to NR
- Extend the geographical coverage of <1 GHz
- Simpler mobility and traffic

More near term business opportunities

- 5G NSA
- 5G SA

*Supported in 23Q4