Small Cell Protocols
Software solutions for 4G/5G base station

Overview

Small Cell Protocols is a software suite realizing functionalities of LTE small cell base station (eNB). Small Cell Protocols consist of the following elements depicted in Figure 1:

- eNB Stack, which includes layers 2 and 3
- eNB scheduler
- PHY layer provided by a third party supplier (SoC vendor).

LTE eNB Stack interfaces through FAPI with LTE eNB scheduler and with PHY layer. Thanks to the use of FAPI-compliant interfaces the component blocks can be used independently.

The software suite is primarily designed to building carrier-class LTE femto- or pico-cells. It can also be used in development of repeaters, test and measurement tools, as well as in various R&D projects on 4G and 5G.

Technical specification summary

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td>C-based implementation of 3GPP</td>
<td>Support for 3GPP Rel 9 with some features from next releases Implementation in C portable on various hardware platforms (ARM, PowerPC, x86)</td>
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<tr>
<td>Modularity enabling vertical markets</td>
<td>Independent component modules with well-defined interfaces allow for flexible setup of necessary software to address multiple vertical markets. Hence we create a library of independent modules instead of a single monolith software element.</td>
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<tr>
<td>Readiness for C-RAN and flexible functional splits</td>
<td>There may be numerous functional splits within small cell base station functionality. We select and implement those which are useful from the perspective of base station virtualization in order to enable multiple options for functional partitioning between RRU, BBU and cloud resources.</td>
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<td>Ready for coming 5G PHY layer components</td>
<td>The industry do not yet have 100% clear picture of what will be the future 5G PHY components. However, we are already making Small Cell Protocols ready to support the following: unified frame concept, ability to handle new waveforms, massive MIMO and millimeter Waves.</td>
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Use cases

1. Indoor or outdoor pico and femto cells for capacity increase
Small cells are a solution which has the greatest impact on meeting the 1000x network densification target set for 5G.

2. Verticals: public safety, military, automotive, smart cities
It is expected that small cells will be implemented in numerous vertical markets including: private networks, smart cities, public safety, military, mobile networks and many more.

3. Any type of portable networks, including aerial, vehicular, portable
Portable networks give an opportunity to deliver capacity fast where it is needed. Small size and low power design typically attributed to UE are now also desired features of eNB.

4. Private networks
Small cells high modularity, portability and ability to run in virtualized environment (cloud RAN) are important features for both public as well as private networks.

Applications

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<tr>
<th>Application</th>
<th>Benefit</th>
<th>Who can benefit?</th>
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<tr>
<td>Small cell base station development</td>
<td>Small cell protocols shorten significantly development time of small cell base station</td>
<td>Base station OEM ODM</td>
</tr>
<tr>
<td>Test and measurements (T&amp;M) equipment development</td>
<td>Small cell protocols shorten significantly development time of T&amp;M equipment</td>
<td>T&amp;M OEM</td>
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<tr>
<td>R&amp;D</td>
<td>Small cell protocols serve as an embedded real-time operating platform suitable for research on eNB-related functionalities</td>
<td>Research Institute, ODM, OEM, Operator</td>
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About IS-Wireless

IS-Wireless is a Polish software developer and IP provider specializing in advanced solutions for wireless systems. IS-Wireless develops 4G and 5G algorithms, protocols and tools.

Our clients are primarily early technology adopters including ODMs, OEMs, chip vendors, and operators. We operate globally delivering our services to companies and organizations from Europe, USA, Africa and Asia. The company is engaged in EU FP7 projects on 5G and is active in delivering technical courses on advanced telecom.

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