ULE Technology Standardization – Basis for the certification

Standardized in ULE Alliance
- HAN FUN (*) Application Layer

Standardized in ETSI (ETSI TS 102 939-1)
- ULE Transport Layer
- Physical Layer
  ULE = DECT

(*) HAN FUN – Home Area Network Functional Protocol

- Specification released in October 2013; available on UA Website
- 20+ device profiles; more in definition
- Specification Available since April 2013
HAN FUN

- HAN FUN version 1.1.0 is the most recent HAN FUN version on which the certification is based on.
- HAN FUN version 1.1.0 was released 3rd of February
- The ULE Alliance decided to make the Application Layer HAN FUN available free of charge
- The use of the standard requires at least Adopter Membership in the ULE Alliance
- You will find the 1.1.0 version of the document on the ULE Alliance website: http://www.ulealliance.org/downloads.aspx?c=w
HAN FUN Profiles

- HAN FUN defines a set of profiles
- A Profile defines a specific functionality for an Application
- A profile describes the behavior as well as the interfaces and services a device has to implement
- Today 25 different profiles are defined
- An existing profiles can be extended with additional optional functionality
- Proprietary profiles are possible as well
- Manufacturers are requested to contribute new profiles which might be of interest for others to the ULE Alliance

Profiles are for example:
- AC Outlet
- Dimmable Light
- Dimmer Switch
- Simple Door Bell
- Simple Power Meter
- Simple Detector
- Window Open/Close Detector
- Motion Detector
- Smoke Detector
- Gas Detector
- Flood Detector
- Siren
ULE Protocol Stack

- ULE Alliance offers its Members an implementation of the HAN FUN Protocol Stack to
  - Ease product development
  - Support the certification process (used as reference implementation and to reduce number of HAN FUN implementations)
  - Encourage Open Source Developers, Students and others interested in Home Automation to start working with ULE
- Code is available at https://github.com/ULE-Alliance
Testing for Certification

HAN FUN (*)
Application Layer

ULE Transport Layer

Physical Layer
ULE = DECT

(*) HAN FUN – Home Area Network FUNctional Protocol
Certification: What can be certified

- **Nodes**
  - For nodes implementing a single profile
  - For nodes implementing multiple profiles
  - For nodes with standard profile(s) and proprietary profile (but according protocol)

- **Concentrator**
  - Pass-Through Concentrators (PTC): PTC’s have no internal logic but only manage the ULE device network. PTC’s will forward all application relevant HAN FUN messages to another entity.
  - Standalone Concentrators (STC): STC’s manage the ULE device network and have an internal application logic.
  - Combined Concentrators (CTC): CTC’s have are a combination of a PTC and a STC with local logic, but also a Pass-Through function.
**ULE Certification testing flow**

- **Testing at approved Test House (AT4 or other):**
  - Non-EU Device: FCC, TELEC, RSS or other similar Certification*
  - EU Device: Comprehensive EN301406 (TBR6) validation

- **Supplemental EN301406 (TBR6) validation**
  - Both EU Band & non-EU Bands of interest

- **Interoperability testing (At AT4 Wireless):**
  - Partial ULE Protocol Testing (Band of interest)
  - Full ULE Protocol Testing (EU Band)

- **Document with test description and self declaration template**
  - Will be made available at UA website 13th of February

*Simply Secure Connectivity*
Interoperability testing

Interoperability testing

Profile Test

Protocol & Service Test

ULE Certification Program

Conformance Testing

RF Test*

*All Protocol and Service Test/Profile Test will be conducted in EU Band
Interoperability testing

- ULE Interoperability (IOP) testing is intended for end product not modules or components
- Testing is done using end products and a test bed with which the end product must interoperate
- There will be not a single ULE Interoperability test tool but a test bed with various devices
Test Setup

- For node and concentrator testing a test bed will be defined which consist of a set of ULE nodes and ULE concentrators.
- The devices in the test bed are selected during IOP sessions of the TWG.
- The majority of the devices are off the shelf products (TD).
- There are instrumented devices to increase test depth (ITD).
- Tests are executed according to a test specification which defines which test need to be performed.
# Test Bed: Concentrators

<table>
<thead>
<tr>
<th>Test-Bed ID</th>
<th>Device Name</th>
<th>HW-ID</th>
<th>SW Version</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01</td>
<td>Concentrator (Instrumented Device)</td>
<td>452 IP Board v4.3</td>
<td>v_1.0.31.1901</td>
<td>Dialog</td>
</tr>
<tr>
<td>C02</td>
<td>USB Dongle (Instrumented Device)</td>
<td>DCX81 USB FW B</td>
<td>Device: CMBS 3.65 Build 32 PC App: 1.1J Build 30345</td>
<td>DSP Group</td>
</tr>
<tr>
<td>C03</td>
<td>Gateway (Instrumented Device)</td>
<td>EASY80920 1.4.1.A.22</td>
<td>UGW-6.1.1-1232-15Dec14, VoIP-SS-3.8.1.02, DECT-SS- 6.1.1.12, COSIC-3.1.3, BMC-9.3.3, HANFUN-agent-0.3.0, HANFUN-lib-1.20</td>
<td>Lantiq</td>
</tr>
</tbody>
</table>
# Test Bed: Nodes

<table>
<thead>
<tr>
<th>Test-Bed ID</th>
<th>Device Name</th>
<th>HW-ID</th>
<th>SW Version</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>N01</td>
<td>Development Board (Instrumented Device) - Switch (On-Off) - Simple Light - Motion Detector - AC Outlet - Raw Data</td>
<td>SC14WSMDATA_SF01_DB (VG)</td>
<td>WSMDATA_1_0_8_00226</td>
<td>Dialog</td>
</tr>
<tr>
<td>N02</td>
<td>Smart Plug (Prototype)</td>
<td>TAN3111A5</td>
<td>WSMDATA_1_0_8_00226</td>
<td>Dialog</td>
</tr>
<tr>
<td>N03</td>
<td>Motion Detector (Product)</td>
<td>dhx91-dhan_mb-c#05</td>
<td>1.1J 27.17#0.1.0.15</td>
<td>Crow</td>
</tr>
<tr>
<td>N04</td>
<td>Magnet (Product)</td>
<td>dhx91-dhan_mb-c#02</td>
<td>1.1J 27.17#0.1.0.7</td>
<td>Crow</td>
</tr>
<tr>
<td>N05</td>
<td>Flood Detector/Water Leakage (Product)</td>
<td>dhx91-dhan_mb-c#02</td>
<td>1.1J 27.17#0.1.0.4</td>
<td>Crow</td>
</tr>
<tr>
<td>N06</td>
<td>Device development board (Instrumented Device) - Smoke Detector - Motion Detector - AC Switch - Glass Break - Raw Data</td>
<td>DHX91 development board</td>
<td>271.7</td>
<td>DSP Group</td>
</tr>
</tbody>
</table>
Test Matrix for Nodes:

- For each node all applicable tests must be performed as indicated in the PICS file for the DUT.
- All tests must be performed against all Concentrators in the test bed (C01, C02, C03) using EU Band.
- Additionally, for DUTs supporting other bands, the DUT must be tested against C02 test bed device in each one of the non EU bands supported. Only the generic setup procedure must be executed for this sanity test.
Test Matrix for Concentrators:

- **Pass-Through Concentrators (PTC):**
  - Pass-Through concentrators (PTC) have no internal logic but only manage the ULE device network. PTC’s will forward all application relevant HAN FUN messages to another entity. A PTC device could be for example a ULE Over The Top (OTT) Box working as a gateway for ULE messages to Ethernet or Wi-Fi.
  - PTC’s must be tested against (in EU Band): N01, N03, N06
  - With the instrumented device N06 all interfaces described in the standard must be tested.

- **Standalone Concentrators (STC):**
  - Standalone Concentrators (STC) manage the ULE device network and have an internal application logic.
  - STC’s must be tested against (in EU Band): N01, N03, N06
  - For N01 and N03 all Device Management and Service functions must be tested. Only the Interfaces indicated in the STC’s PICS document must be tested.
  - With the instrumented device N06 all the Interfaces indicated in the STC’s PICS document must be tested.

- **Combined Concentrators (CTC):**
  - Concentrators which have a local logic, but also a Pass-Through function must pass tests for PTC and STC devices.

- **For All DUT’s** supporting other bands than the EU band, the DUT must be tested against N06 test bed device in each one of the non EU bands supported. Only the generic setup procedure must be executed for this sanity test.
SIMPLY SECURE CONNECTIVITY

BY JOINING THE ULE ALLIANCE