Where does DALI Fit in a Wireless World?

Arnulf Rupp
DiiA / OSRAM
Many wireless ecosystems already leverage DALI/D4i in the luminaire – Enough?
Enough? – The DiiA member survey says no!

Q3: The current status of DALI-2 certification is shown on our website (www.dali2.org/dali2). Please note that Parts 202, 209, and the D4i Parts are all in progress. What further Parts should be added to DALI-2 certification? Please indicate your priority: low – medium – high

Where does DALI Fit in a Wireless World?
The boon and bane of having options

D4i gives many options how to connect a DALI / D4i based luminaire with wireless networks. So far, DiiA is wireless-protocol agnostic.

* Auxiliary (AUX) power supply can be in a driver, or implemented in a separate product.
### The boon and bane of having options

<table>
<thead>
<tr>
<th>Best choice in:</th>
<th>But: “Improvement Areas”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application protocol</td>
<td>Limited interoperability</td>
</tr>
<tr>
<td>Radio range</td>
<td>No End-to-End (DALI) testing</td>
</tr>
<tr>
<td>Data rate</td>
<td>Complex to explain to customers</td>
</tr>
<tr>
<td>Legislative requirements fit</td>
<td>Cost of modularity</td>
</tr>
<tr>
<td>Cost/Performance match</td>
<td>Inconsistency with DALI feature set</td>
</tr>
<tr>
<td>Fit with existing eco-system</td>
<td>No all-in-one DALI eco-system</td>
</tr>
<tr>
<td></td>
<td>Wired &amp; Wireless combined</td>
</tr>
</tbody>
</table>

But: "Improvement Areas"
Two Programs started in DiiA

<table>
<thead>
<tr>
<th>1 Eco-System Partnership</th>
<th>2 DALI Wireless</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standardized Gateway(s)</strong></td>
<td><strong>Wireless transport for the DALI protocol</strong></td>
</tr>
<tr>
<td>Verified Interoperability</td>
<td>Based on IEC 62386-104</td>
</tr>
<tr>
<td>Joined Certification</td>
<td>New certification program and new test tools in cooperation with partner organization</td>
</tr>
</tbody>
</table>

**But: “Improvement Areas”**
- Limited interoperability
- No End-to-End (DALI) testing
- Complex to explain to customers
- Cost of modularity
- Inconsistency with DALI feature set
- No all in one DALI eco-system
- Wired & Wireless combined
Most wanted by Regular Members…

1. Eco-System Partnership
   - Standardized Gateway(s)
   - Verified Interoperability
   - Joined Certification

2. DALI Wireless
   - Wireless transport for the DALI protocol
     - Based on IEC 62386-104
     - New certification program and new test tools in cooperation with partner organization

Partner Organization
   - Partner Organizations will be identified by DiiA Working Groups

Digital Illumination Interface Alliance

Digital Summit 2019
Gateway Standardization

1. Eco-System Partnership

Standardized Gateway(s)
Verified Interoperability
Joined Certification

Specify gateway behavior:

1) Create consistency of interpretation for control commands
2) Certification of gateway components including “DALI Style” verification of physical lighting parameters
3) DiiA will focus on D4i gateway applications first. D4i luminaires do not require commissioning on the D4i subnet. A D4i-Ecosystem gateway practically makes a luminaire an Ecosystem luminaire.
Native DALI Wireless Ecosystem

2. DALI Wireless

Wireless transport for the DALI protocol

Based on IEC 62386-104

New certification program and new test tools in cooperation with partner organization

Wireless mesh
Part 104 over alternative transport e.g. Bluetooth Mesh or Thread

Wireless D4i "bridge" no protocol gateway

Application controller

Part 104

D4i luminaire

Input device

Control gear

Input device

Control gear
Native DALI Wireless Ecosystem

Where Does the **DALI Wireless Ecosystem** Fit in a Wireless World? What would be the unique feature set in a world of options?
Full DALI Feature Set – Same as Wired

Wireless transport for the DALI protocol

Based on IEC 62386-104

New certification program and new test tools in cooperation with partner organization
Wired & Wireless in One System

2 DALI Wireless

Wireless transport for the DALI protocol

Based on IEC 62386-104

New certification program and new test tools in cooperation with partner organization

Application Controller

Application logic:
Bridging subnets, Scheduling, Hierarchy/priority decisions, …

Wired Subnet

Wireless Subnet
Strong Certification Program

2. DALI Wireless

Wireless transport for the DALI protocol

Based on IEC 62386-104

New certification program and new test tools in cooperation with partner organization

Verification setup (data model):

- Wireless link certified by partner organization or pre-qualified module
- Any DALI Component

Verification of physical electrical and lighting parameters (like wired DALI)
Talks to IP Backbone in Buildings

2. DALI Wireless

Wireless transport for the DALI protocol

Based on IEC 62386-104

New certification program and new test tools in cooperation with partner organization
Multiple Carrier Technologies

2. DALI Wireless

Wireless transport for the DALI protocol

Based on IEC 62386-104

New certification program and new test tools in cooperation with partner organization

Protocol Stack

One DALI Application

UDP/IP Protocol

THREAD
LTE-M
WIFI
Ethernet

Low Power
Long Range Outdoor
High Data Rate
Wired Backbone
Low Power
Summary

- DALI fits in a Wireless World in multiple ways.
- There will not be ONE protocol dominating the world any soon.
- Standardized gateways will allow use of D4i with multi-vendor ecosystems.
- Native DALI has the opportunity to win important markets with its unique set of features combining wired and wireless on multiple carriers including IP-based carriers.