Performance Measurements on Power Line Carrier Data Transmissions in Indoor Office Environments

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Performance Measurements on Power Line Carrier Data
Transmissions in Indoor Office Environments

- Introduction
- Data communications over power lines
- Field measurements results
- Conclusions
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PLC = Data over Power Lines

75 to 9600 bps

1950 - Data transmission on high voltage power lines

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- Radio link
- Low Speed PLC
- Leased Line
- No Communication
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- Radio link
- Low Speed PLC
- Leased Line
- No Communication
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Radio link

Low Speed PLC

Leased Line

High Speed PLC
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Low voltage solution providers

<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>Technology</th>
<th>Speed (Mbps)</th>
<th>Users</th>
<th>Services</th>
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</thead>
<tbody>
<tr>
<td>Spain</td>
<td>Saragossa</td>
<td>Ascom DS2</td>
<td>2...12</td>
<td>3000</td>
<td>Internet VoIP</td>
</tr>
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<td></td>
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<td>Ascom</td>
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Data valid on 03/2005
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Data valid on 03/2005

Very high speed transmission tests announced late 2005 in Germany and Spain (100Mbps)
Field measurements results

Network topology used for our field tests
Field measurements results

Network topology used for our field tests

Power

Devices

Load 1

Load 2

Distance
Field measurements results

Network topology used for our field tests
Field measurements results

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Field measurements results

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Field measurements results

Network topology used for our field tests

Power
Devices
Load 1
Load 2
Distance

PLC 1
ALL1682

Load 1
1000W resistive

Load 2
250VA inductive

PLC 2
ALL1682

Computer 1

Computer 2

230V ca
30 m
20 m
30 ... 350 m
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Test configuration - Low distance

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Low distance - **Excellent** transmission quality ~ 50m

Reply from 192.168.100.103: bytes=32 time=16ms TTL=62
Reply from 192.168.100.103: bytes=32 time<10ms TTL=62
Reply from 192.168.100.103: bytes=32 time=15ms TTL=62
Reply from 192.168.100.103: bytes=32 time<10ms TTL=62
Ping statistics for 192.168.100.103:
Packets: Sent = 393, Received = 392, Lost = 1 (0% loss),
Approximate round trip times in milliseconds:
Minimum = 0ms, Maximum = 23ms, Average = 6ms
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Long distance - Poor transmission quality

~ 350m

Reply from 192.168.100.103: bytes=32 time=126ms TTL=62
Reply from 192.168.100.103: bytes=32 time=18ms TTL=62
Reply from 192.168.100.103: bytes=32 time=156ms TTL=62
Reply from 192.168.100.103: bytes=32 time=118ms TTL=62
Ping statistics for 192.168.100.103:
Packets: Sent = 1567, Received = 1504, Lost = 63 (4% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 328ms, Average = 124ms
Conclusions

› Good performances for Web and Email services
› Energy supply blackout VoIP problems (no 112)
› EMC related problems (shortwave interferences)
› Future investigation and filed tests
PLC partnerships

through our Research Center

- Real world tests on low voltage power networks
- EMC related measurements in customer installations
- Worst conditions test

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Thank you!

Questions?

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