

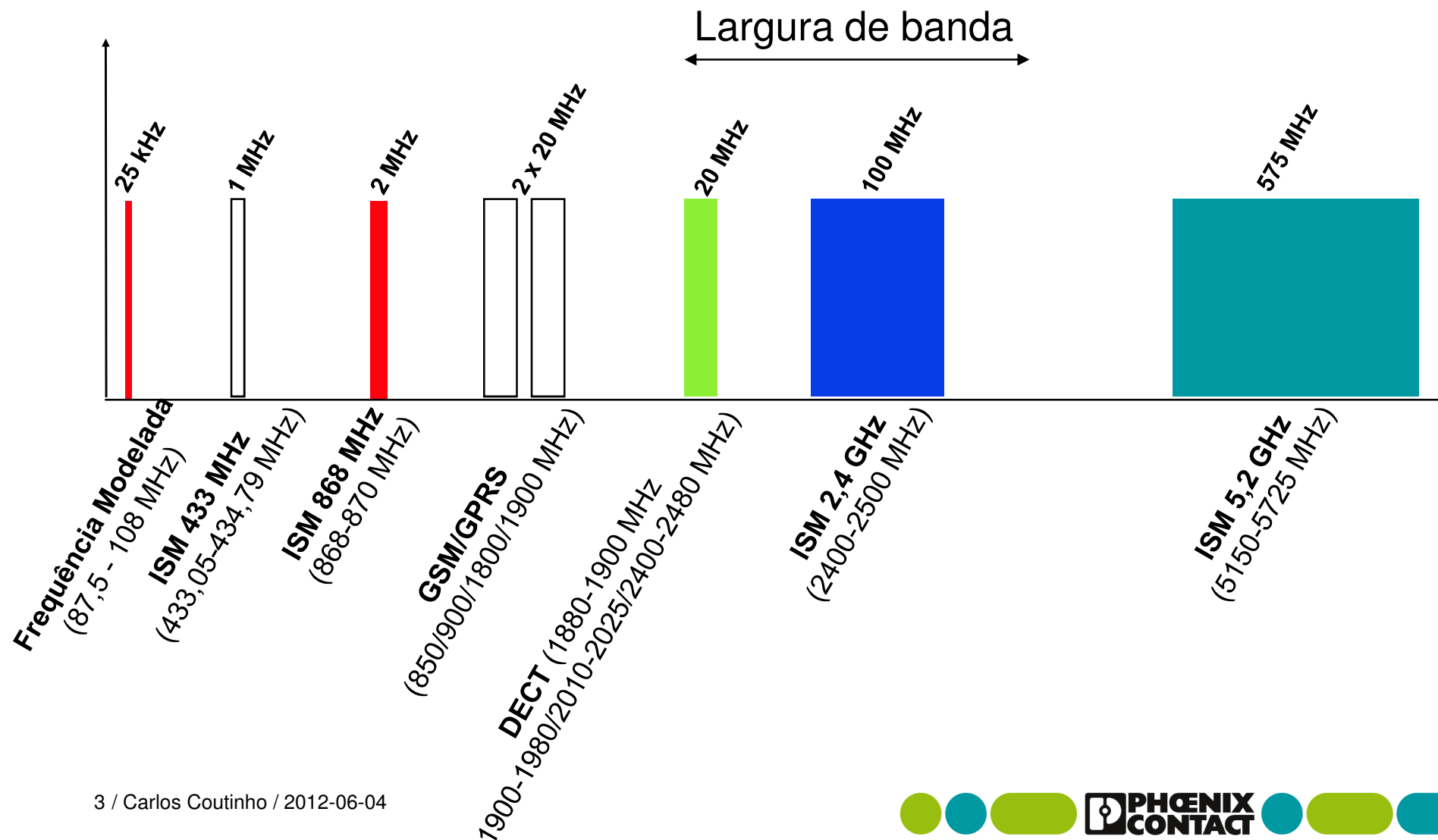
Seminário Técnico **Wireless Automation**

Bem Vindo

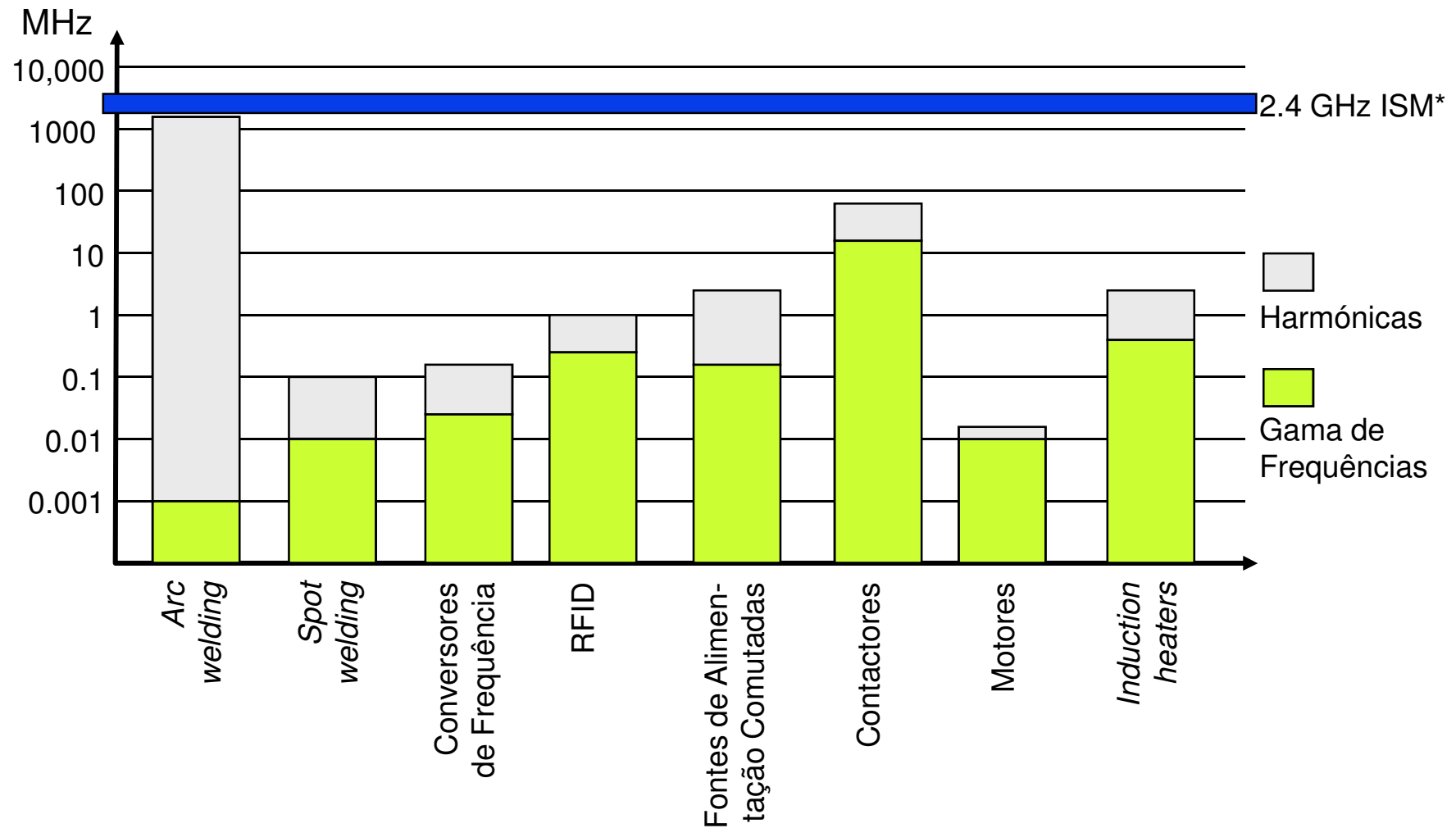
Programa

- Tecnologias e componentes de comunicações sem fios
 - Trusted Wireless
 - Bluetooth
 - Wireless LAN
- Case-studies: realizações de automação e de comunicações sem fios

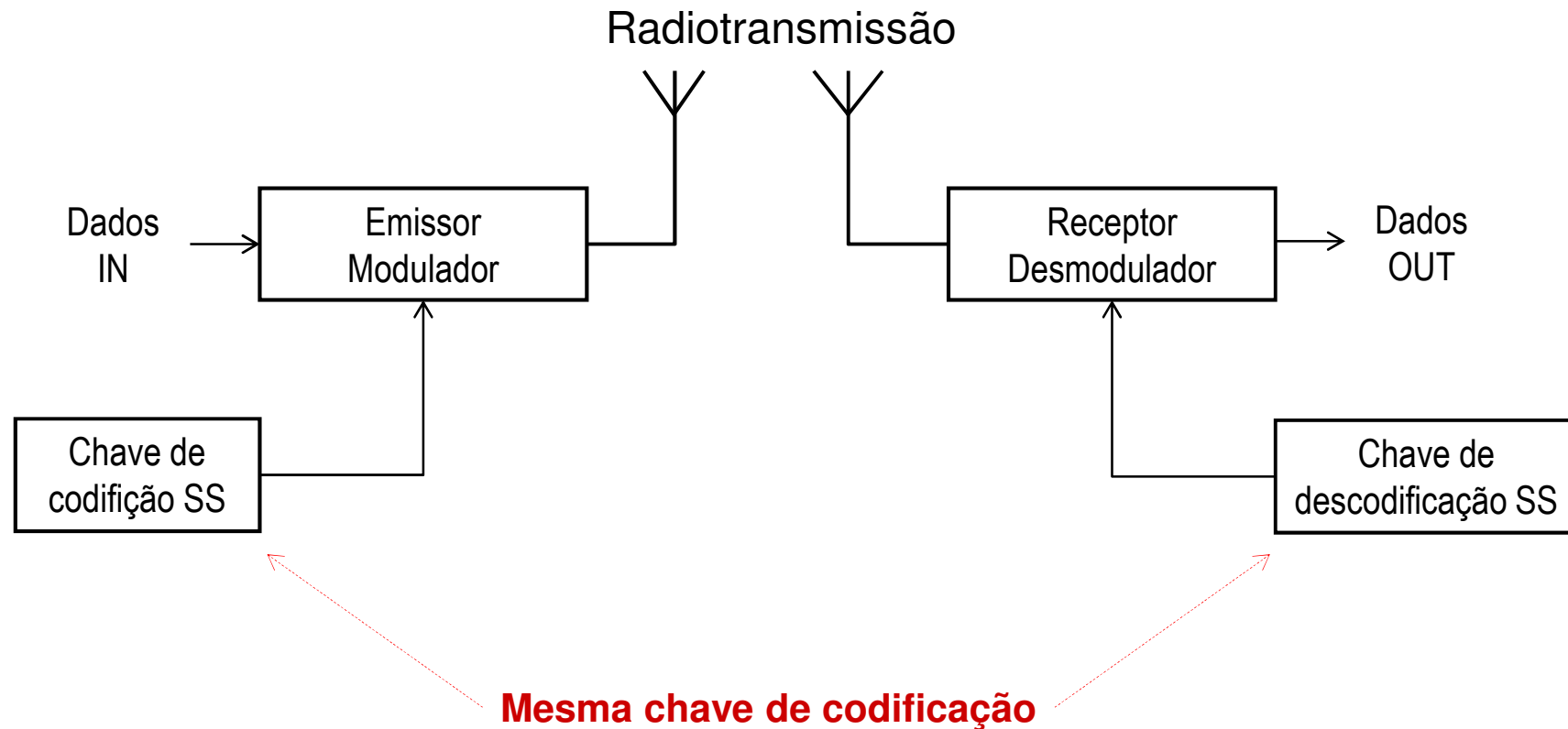
Bandas de radiocomunicações



Espectro radioelétrico na Indústria

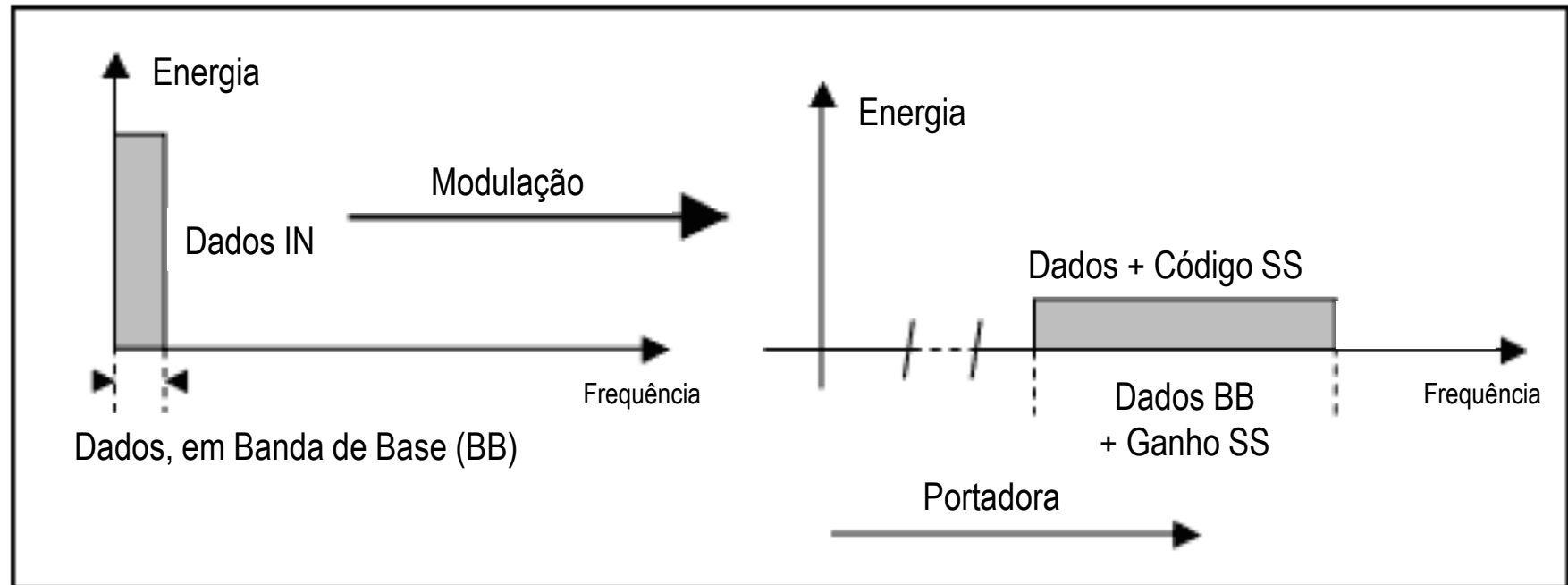


Modulação *Spread Spectrum*



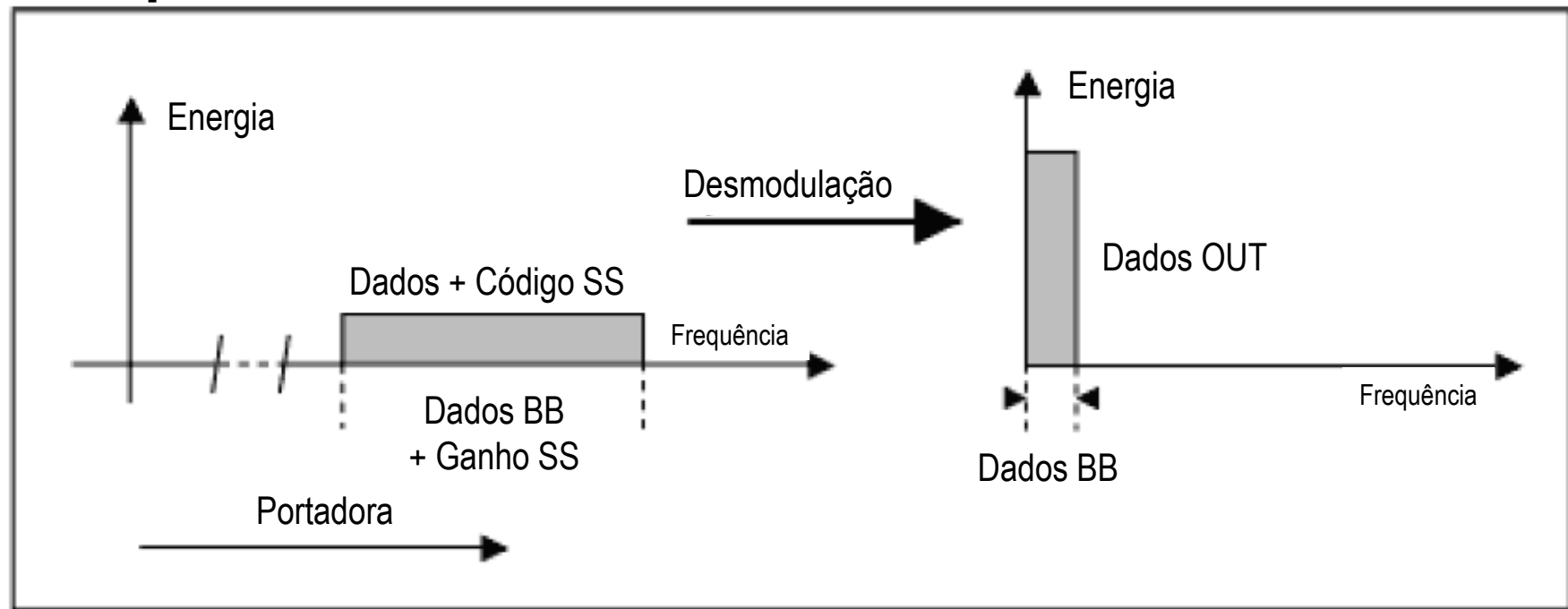
Modulação *Spread Spectrum*

Emissor

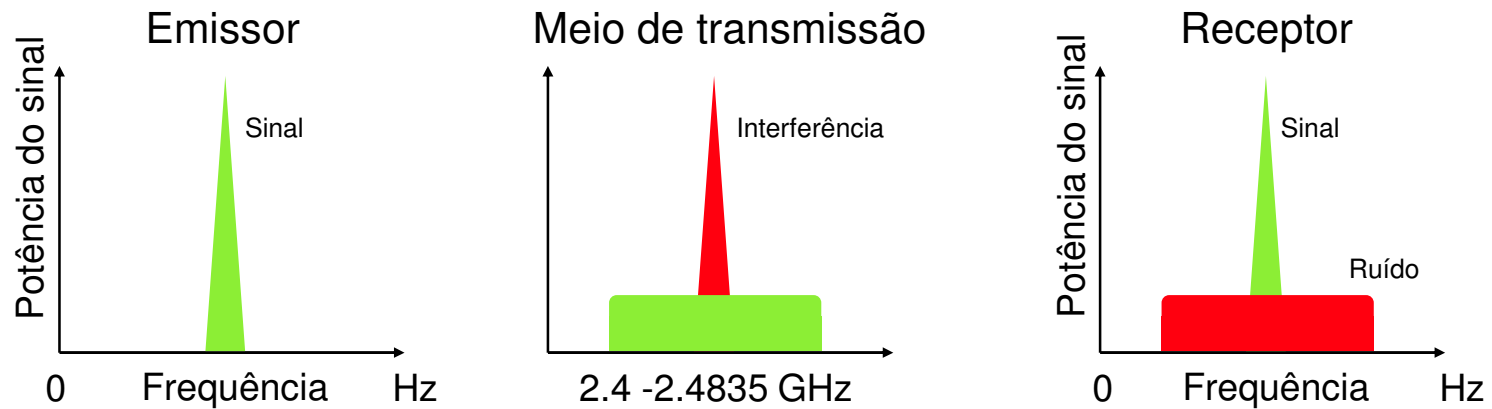


Modulação *Spread Spectrum*

Receptor



Imunidade a interferências



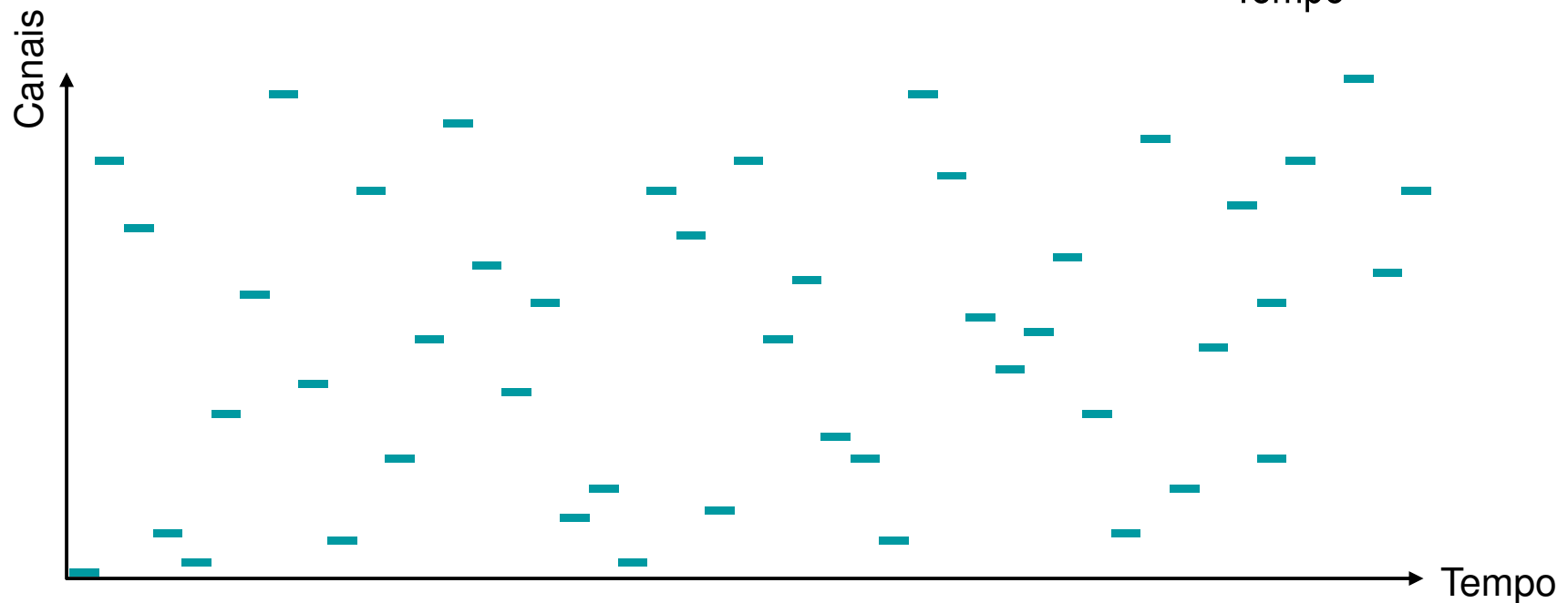
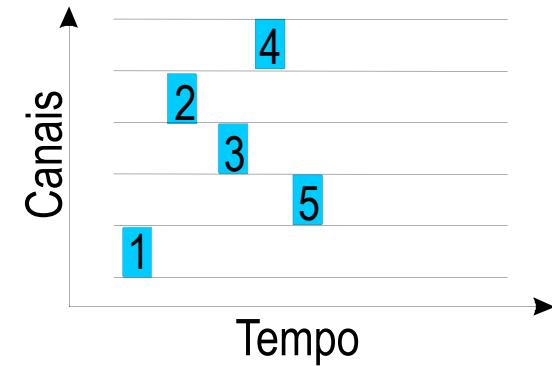
FHSS – Frequency Hopping Spread Spectrum



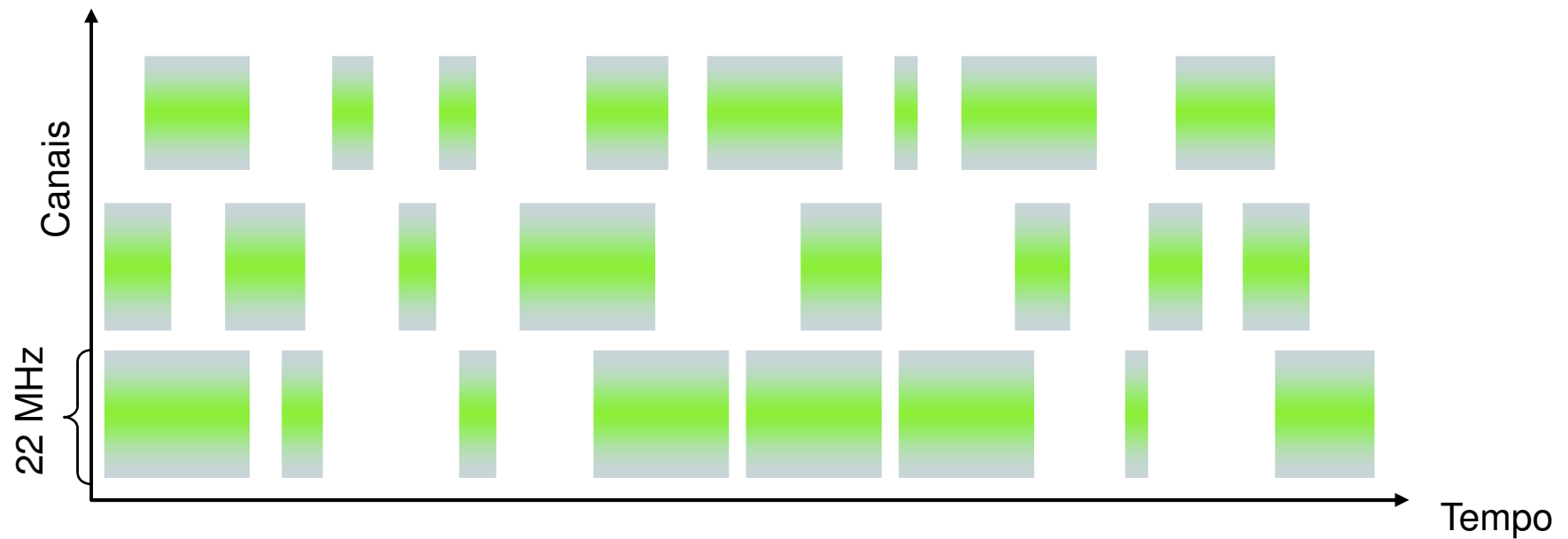
Dados



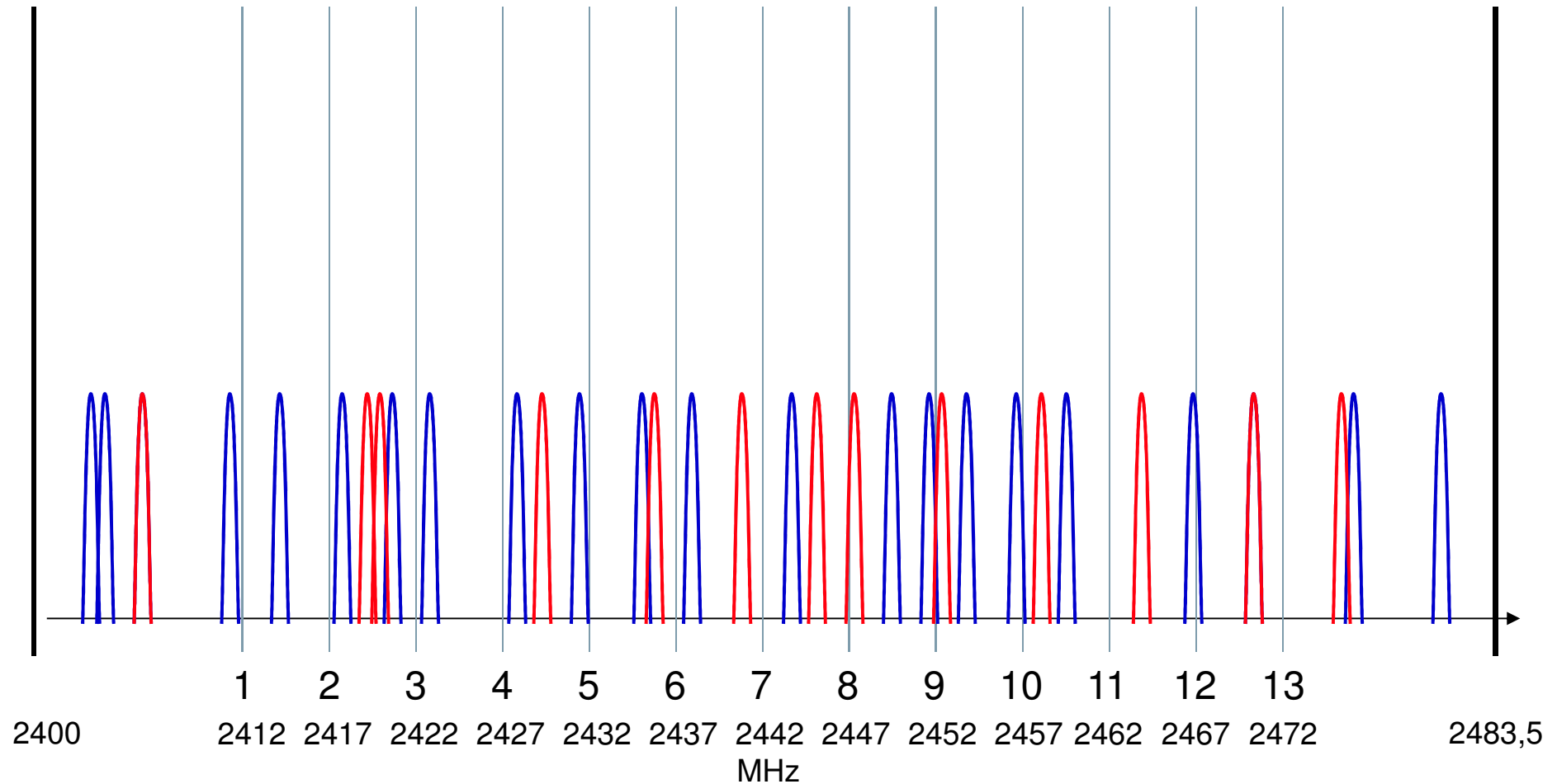
1 2 3 4 5



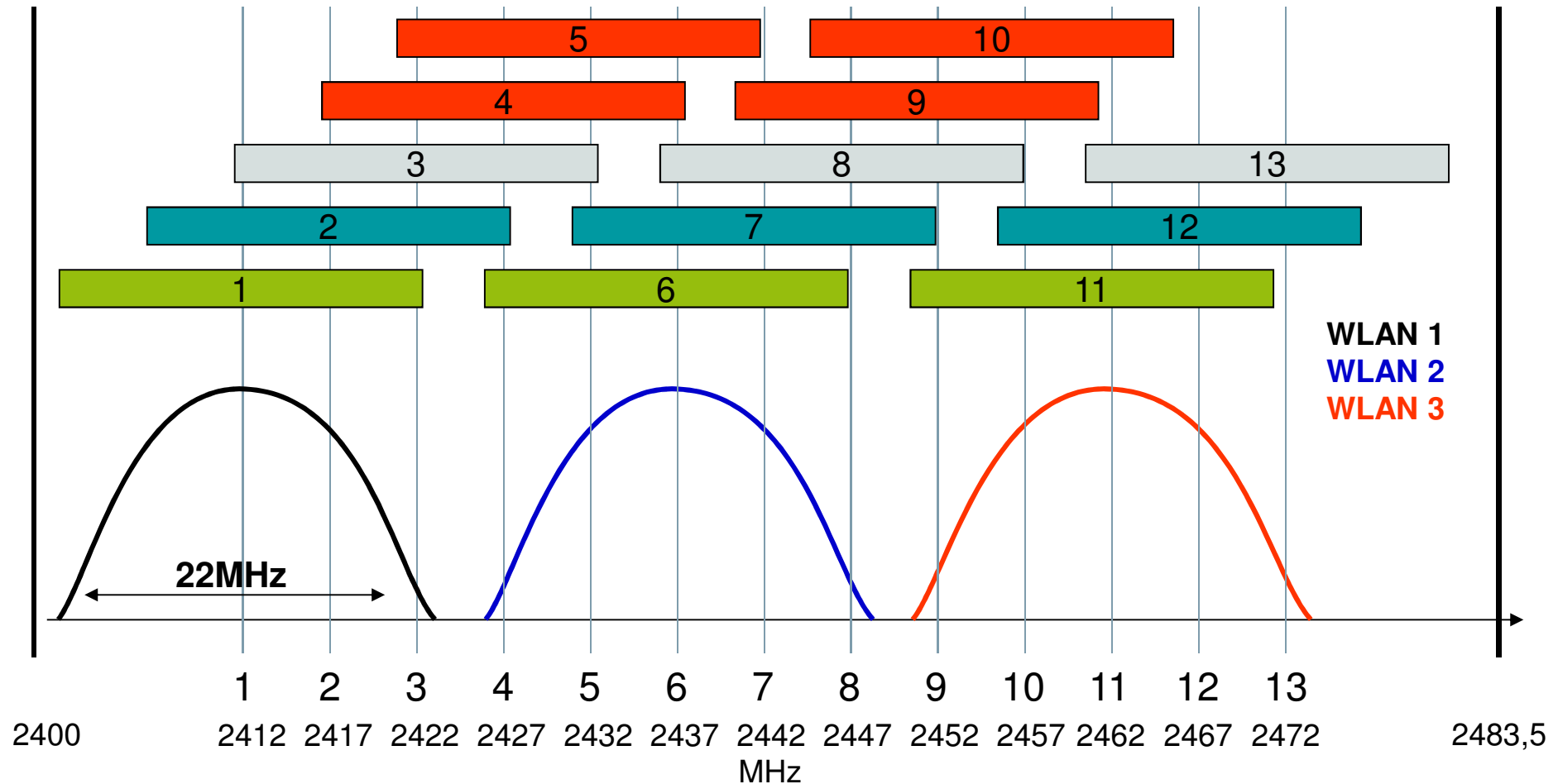
DSSS - Direct Sequence Spread Spectrum



Coexistência de dois sistemas FHSS



Coexistência de 2 sistemas DSSS

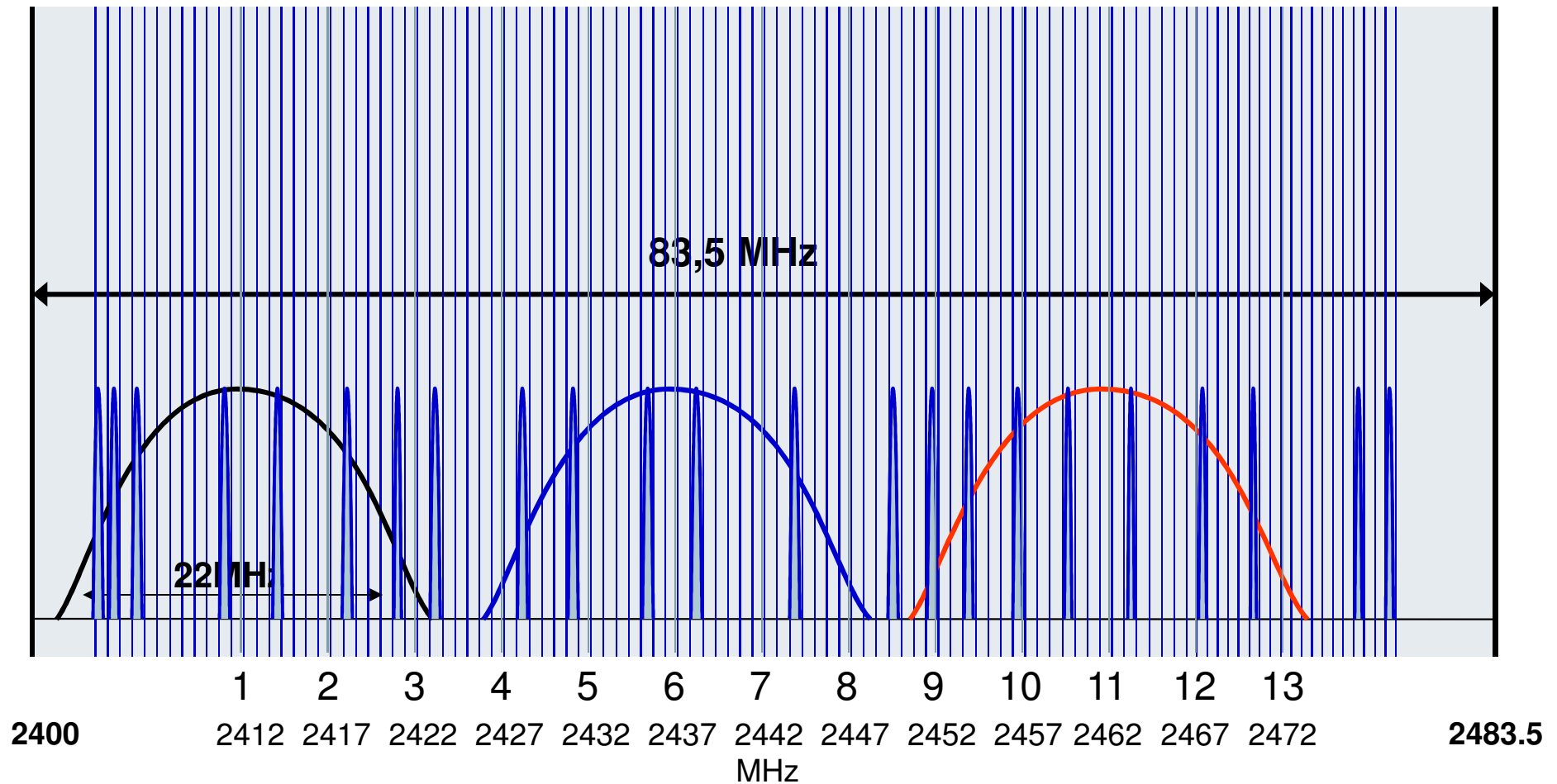


Coexistência WLAN e Bluetooth

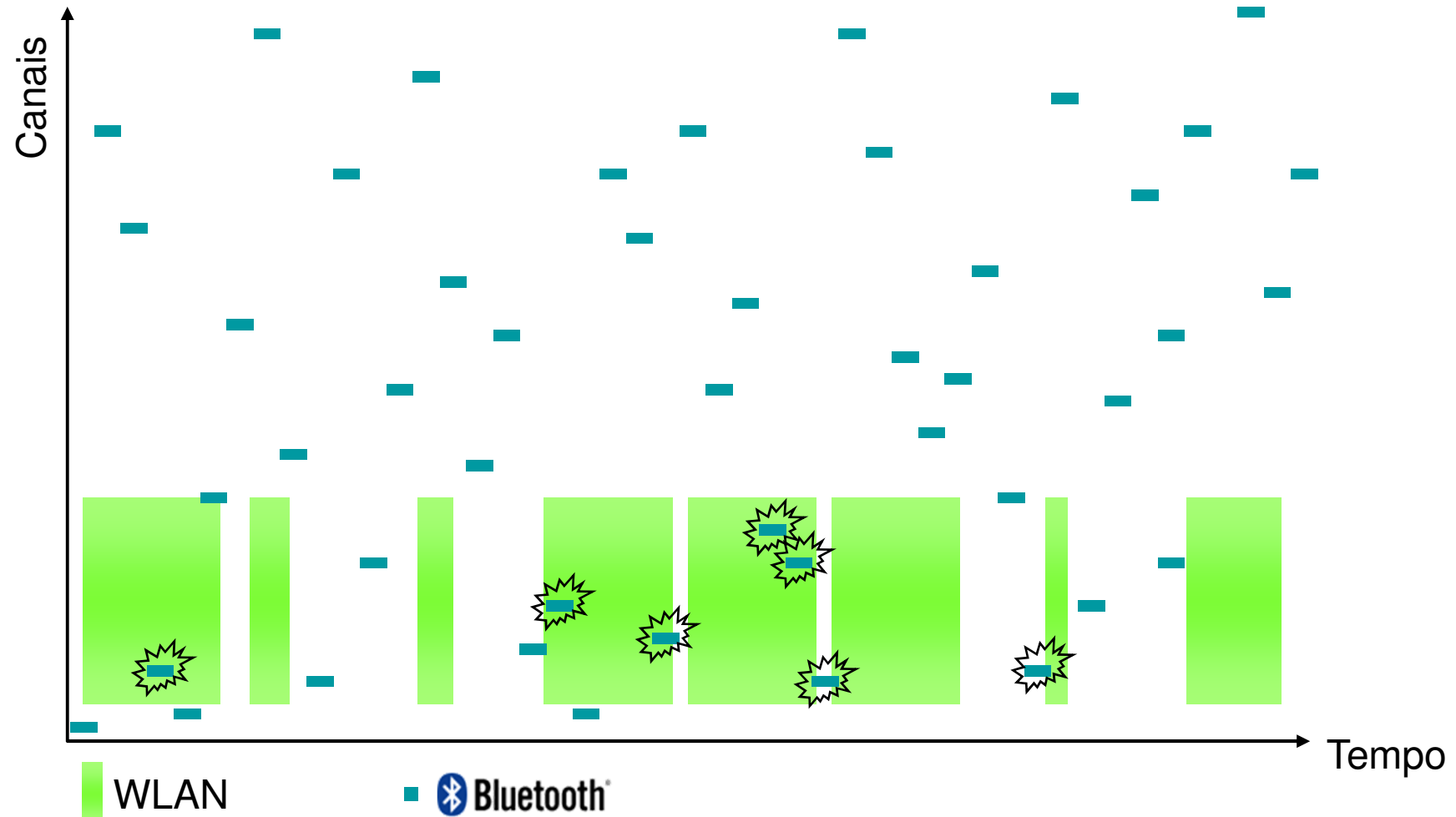


1

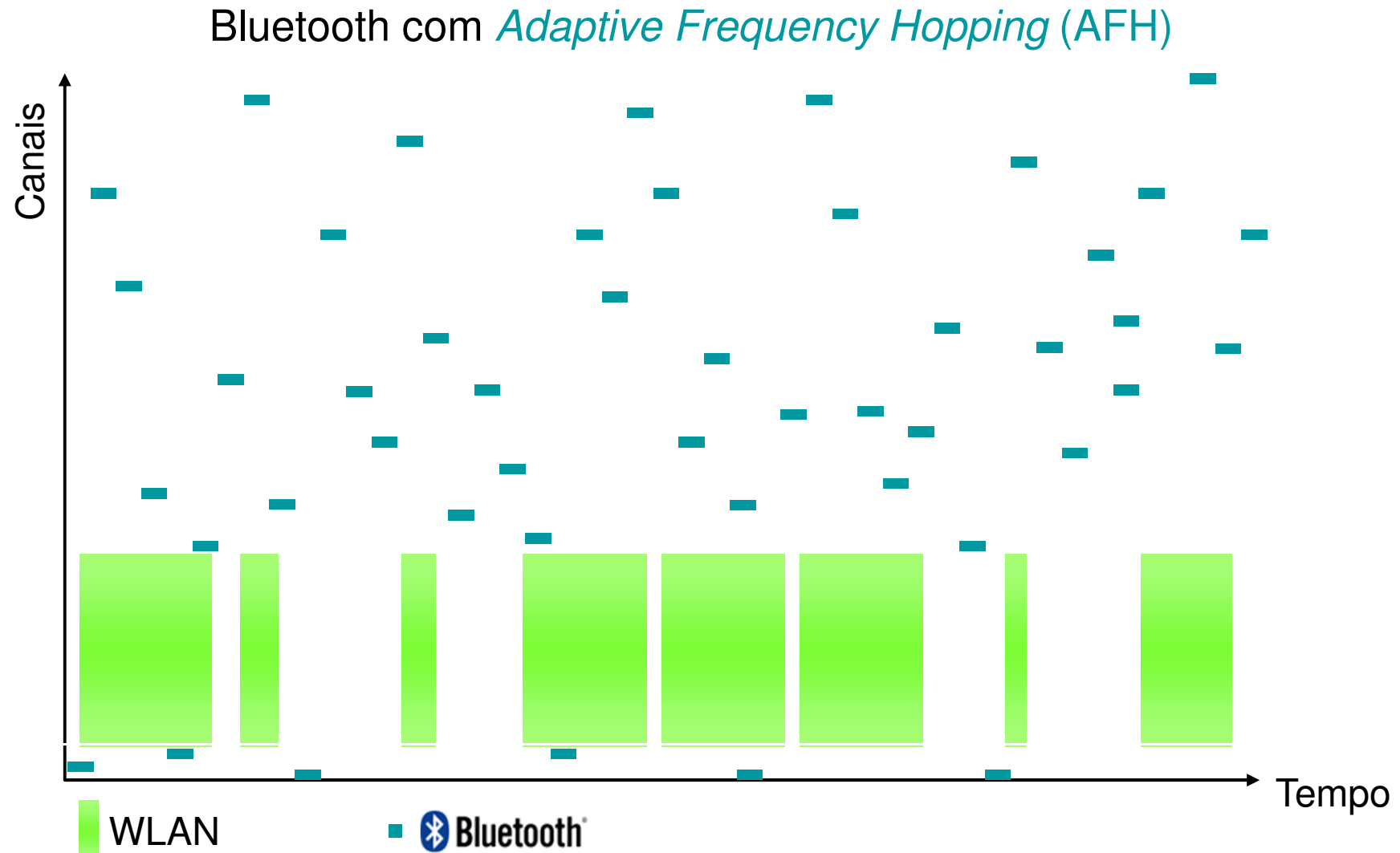
79



Coexistência entre FHSS e DSSS



Coexistência entre Bluetooth e WLAN



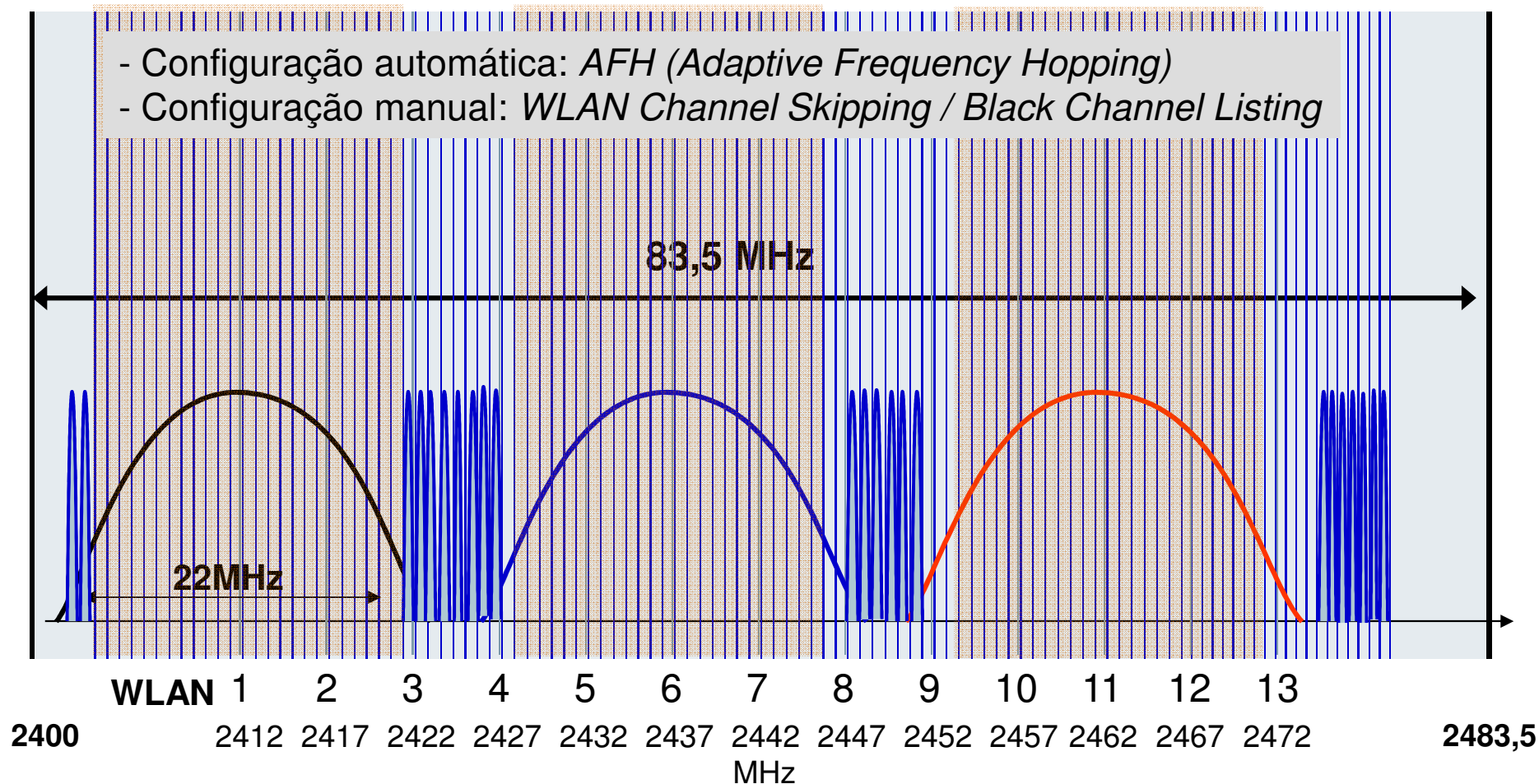
Opções de configuração Bluetooth



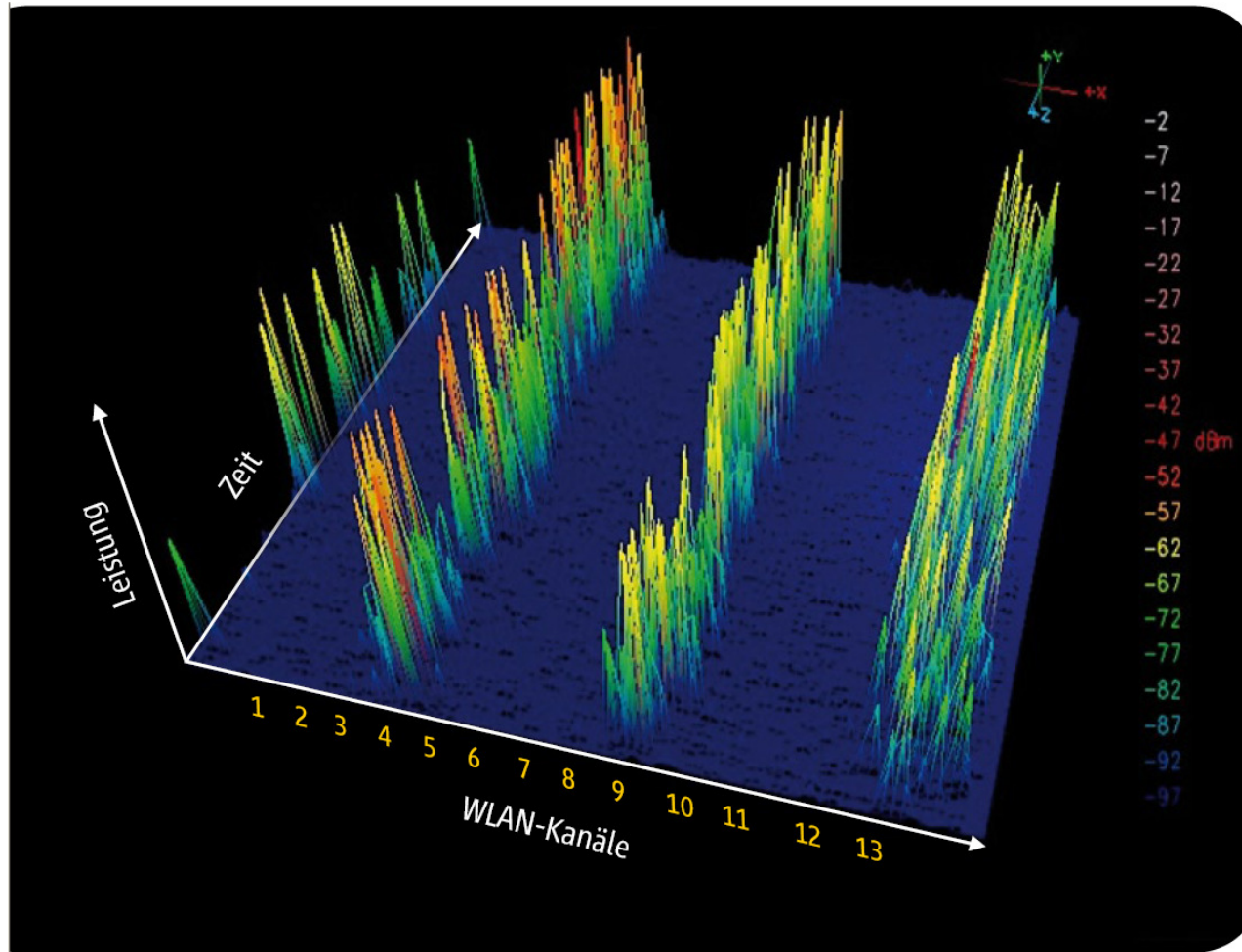
1

79

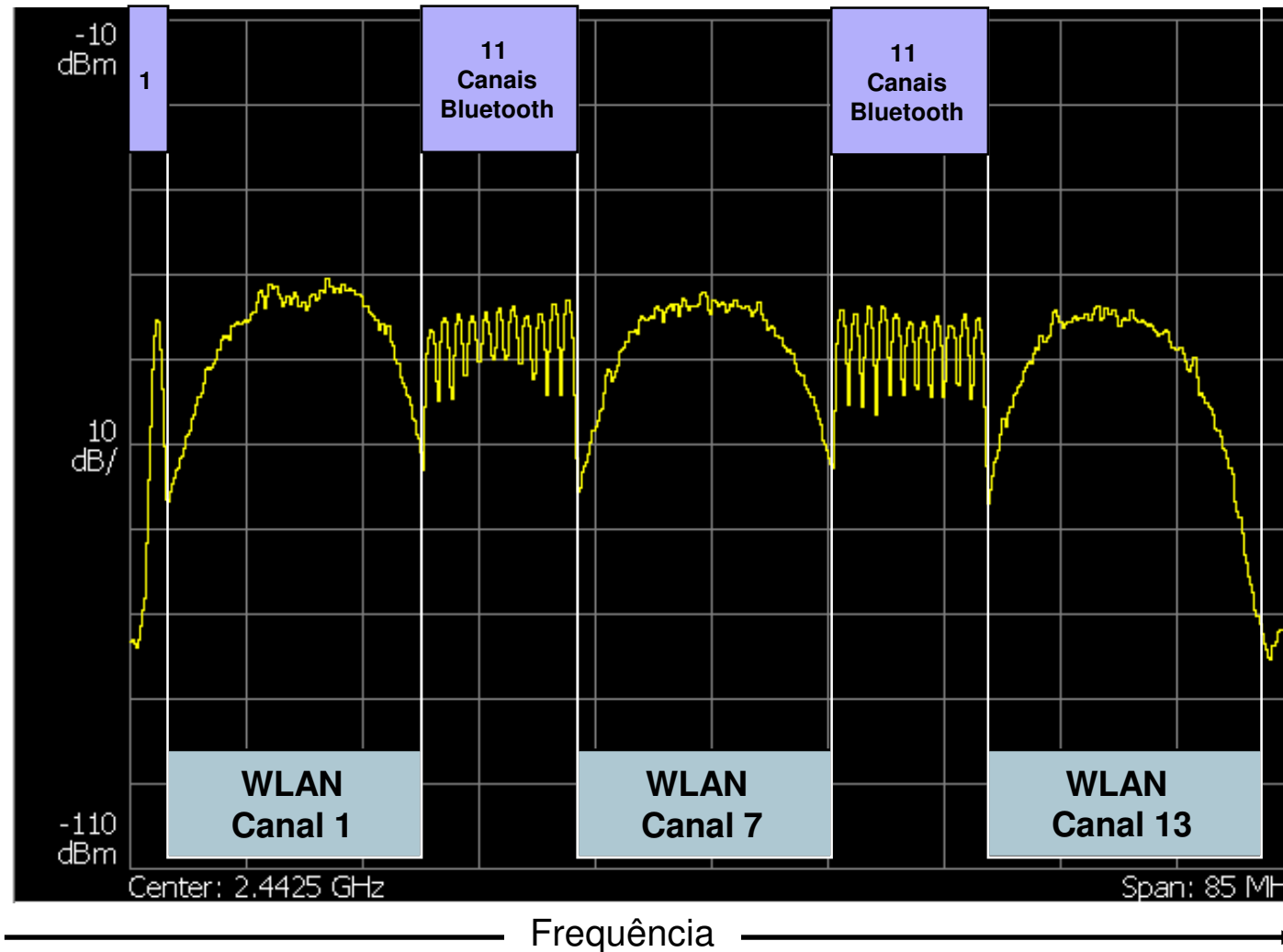
- Configuração automática: *A FH (Adaptive Frequency Hopping)*
- Configuração manual: *WLAN Channel Skipping / Black Channel Listing*



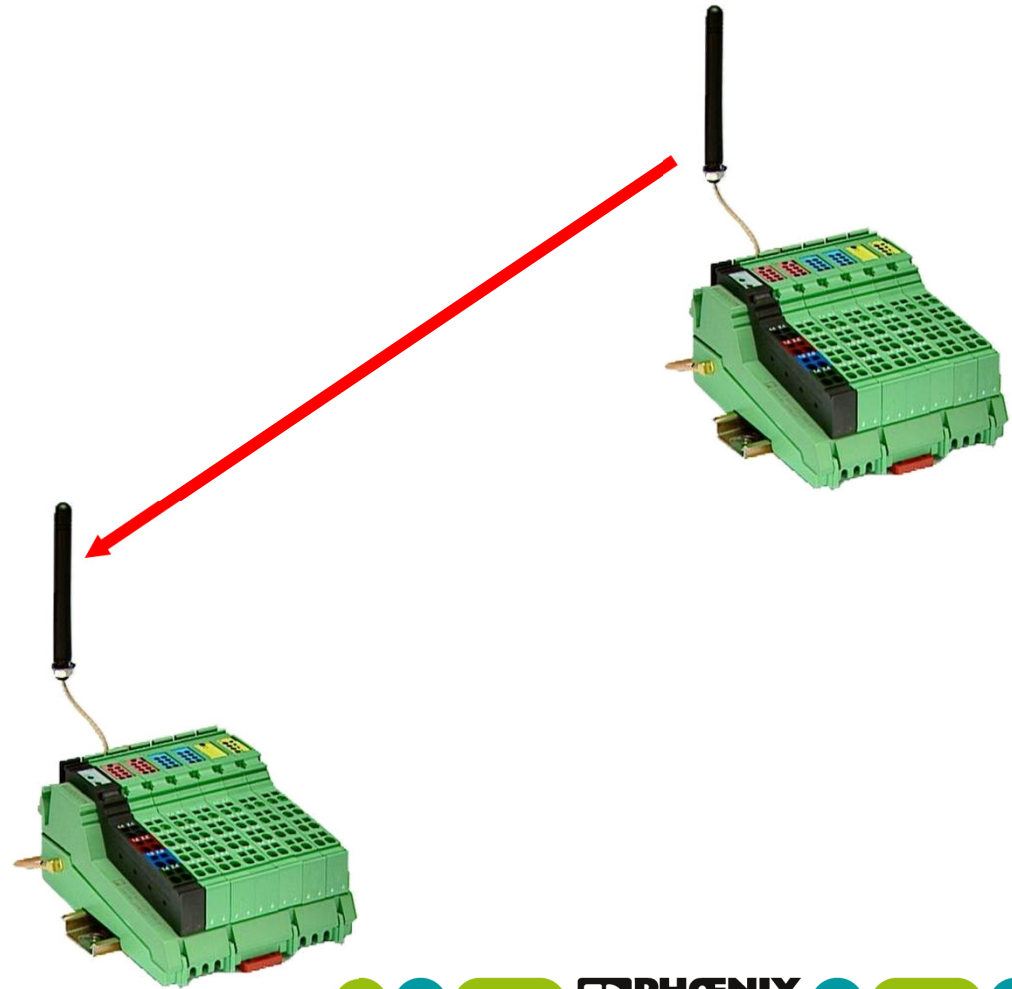
Coexistência entre Bluetooth e WLAN



Coexistência entre Bluetooth e WLAN

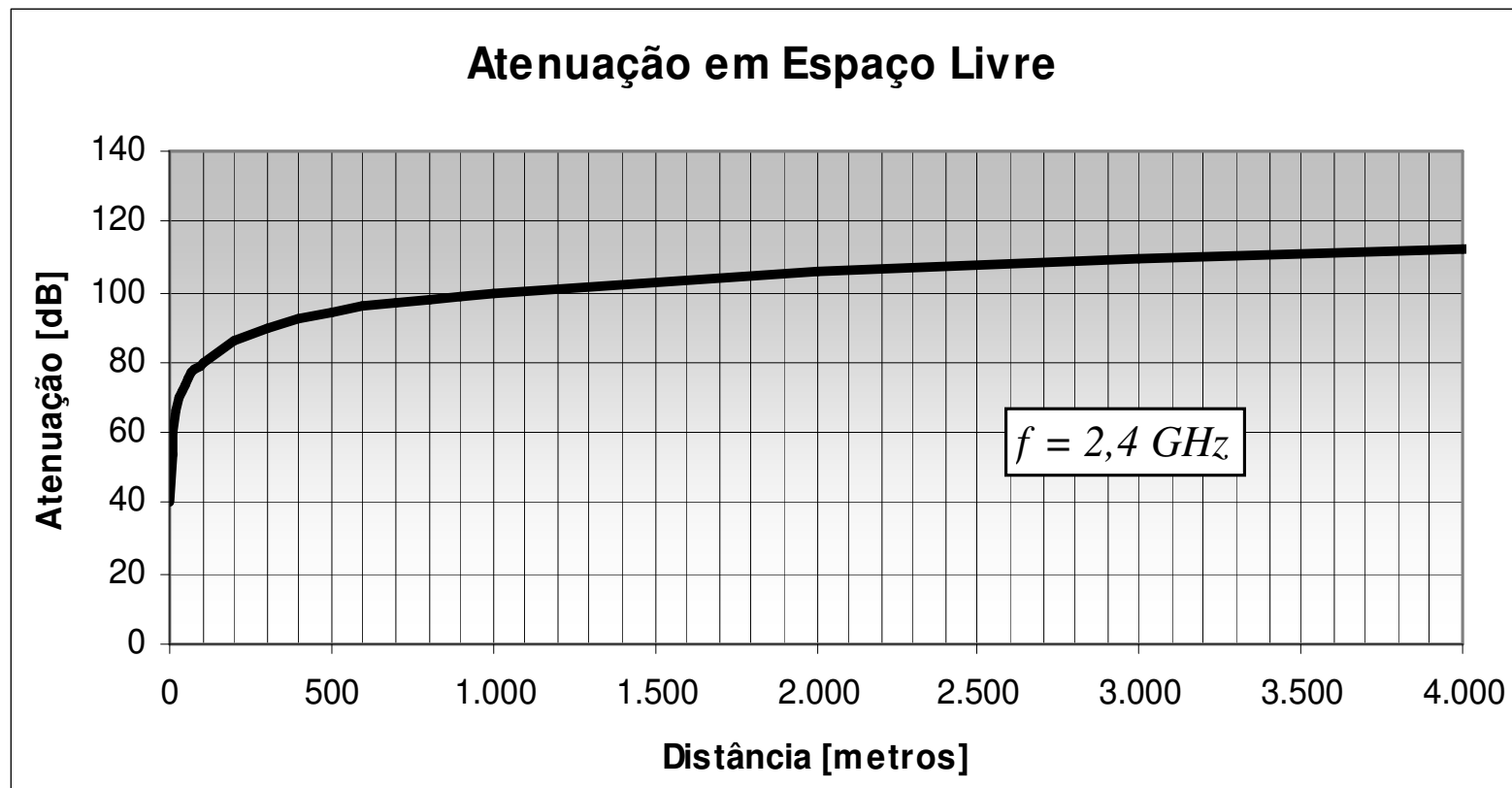


Radiotransmissão em espaço aberto

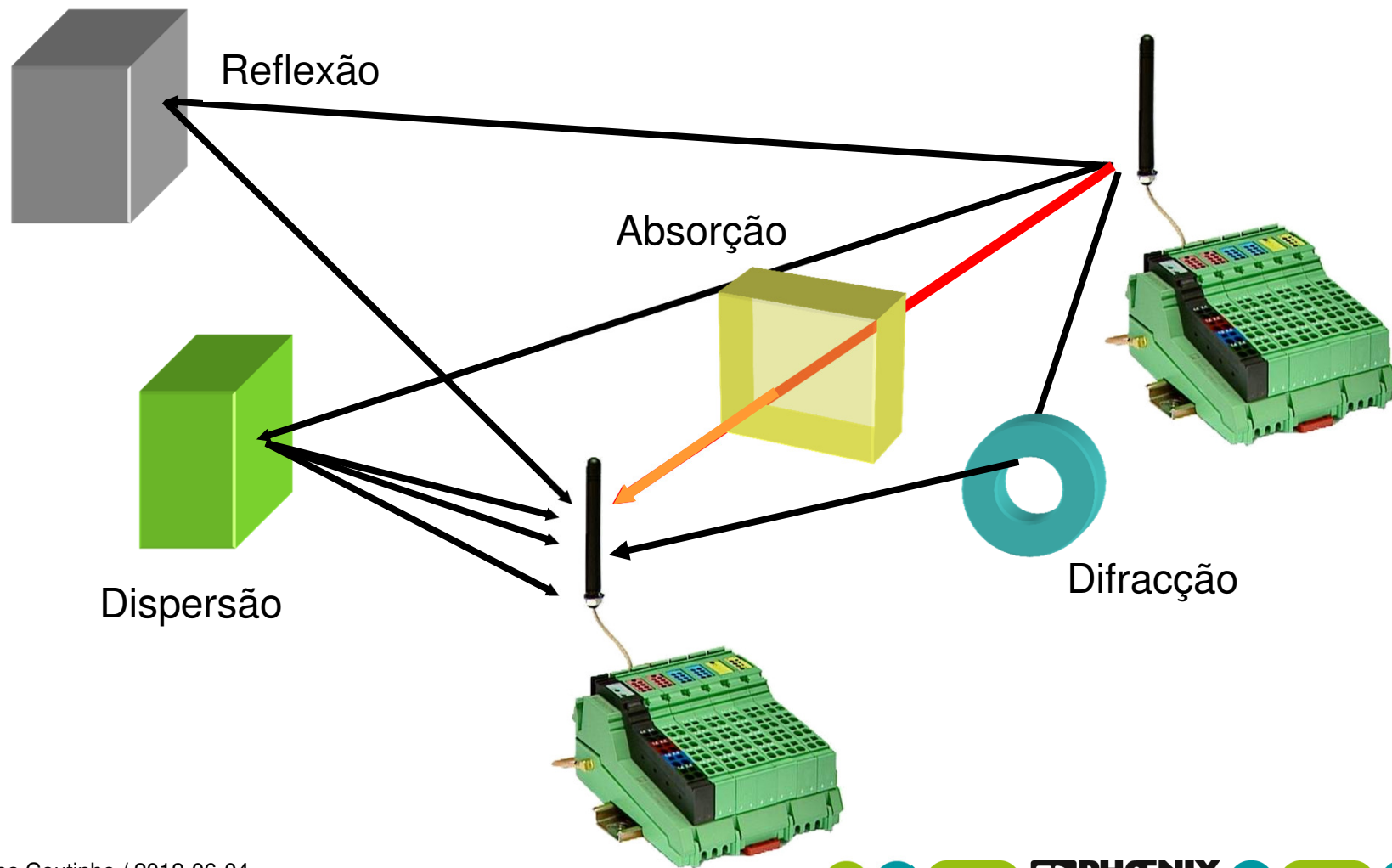


Atenuação em espaço aberto

$$Atenuação [dB] = 32,4 + 20 \cdot \log(f_{MHz}) + 20 \cdot \log(d_{km})$$

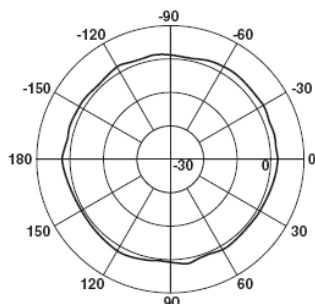


Factores que afectam a radiotransmissão

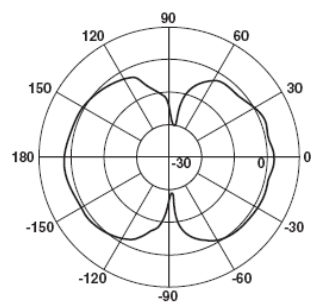


Antenas

Omnidireccional
2 dBi

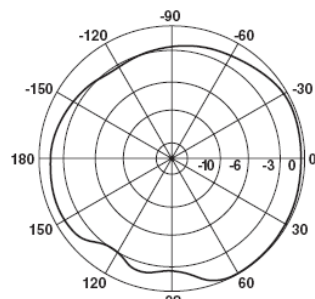


Horizontal

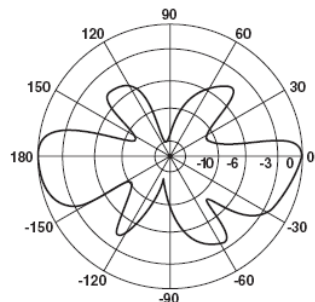


Vertical

Omnidireccional
9 dBi

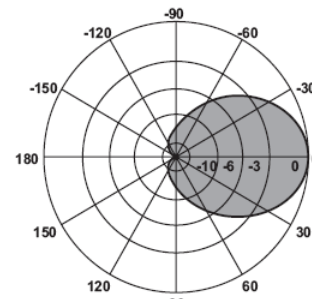


Horizontal

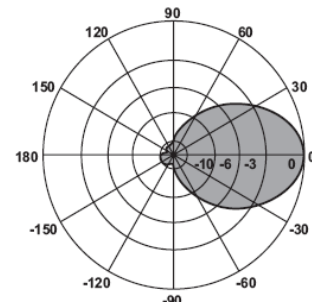


Vertical

Painel
8 dBi

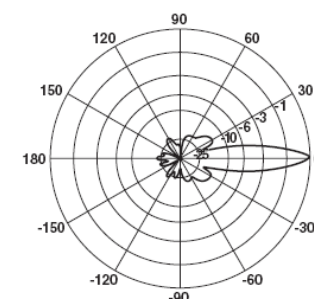


Horizontal

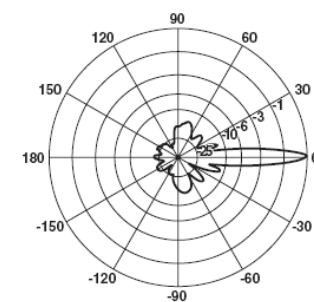


Vertical

Parabólica
19 dBi



Horizontal



Vertical

Tecnologias de comunicações sem fios



- Sinais digitais
- Sinais analógicos
- RS232/RS422/RS485

- Alcance ≤ 3 km
- Actualização ≤ 1 s

- FHSS
- 16 ... 500 kbps



- Sinais digitais
- Sinais analógicos
- RS232/RS422/RS485

- Ethernet

- Alcance ≤ 200 m
- Actualização ≤ 10 ms

- FHSS
- 784 kbps

- IEEE 802.15.1.



- Ethernet

- Alcance ≤ 2 km
- Actualização ≤ 1 s

- DSSS
- 1 ... 600 MHz

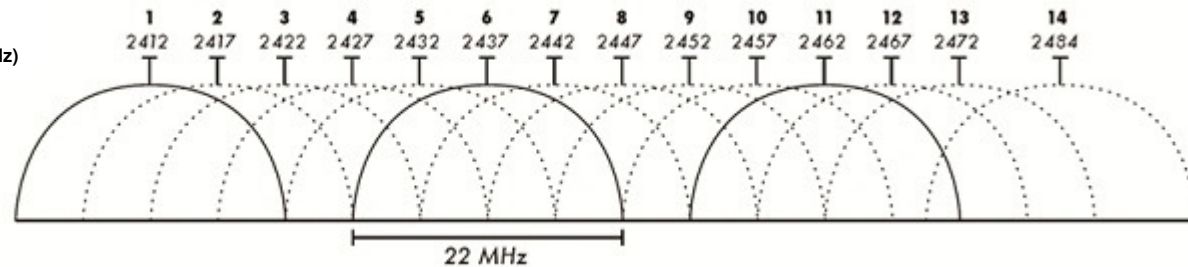
- IEEE 802.11
a/b/g/n

Canais e frequências centrais



Canal
Frequência central (MHz)

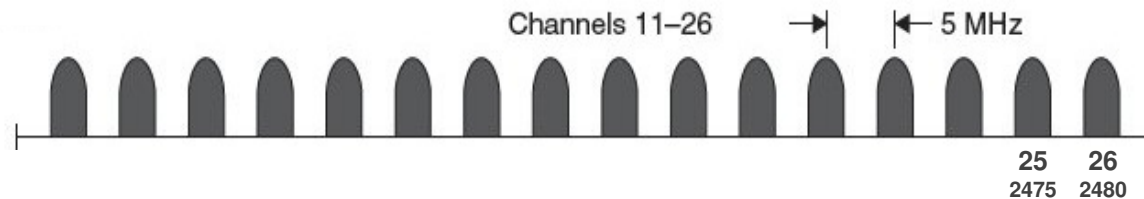
IEEE
802.11



WirelessHART™

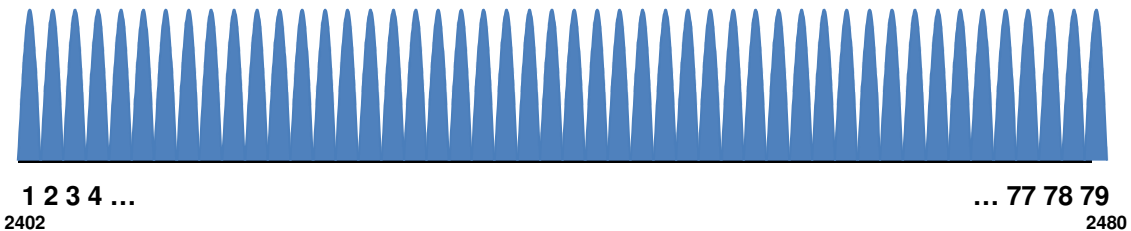
IEEE
802.15.1

Canal
Frequência central (MHz)



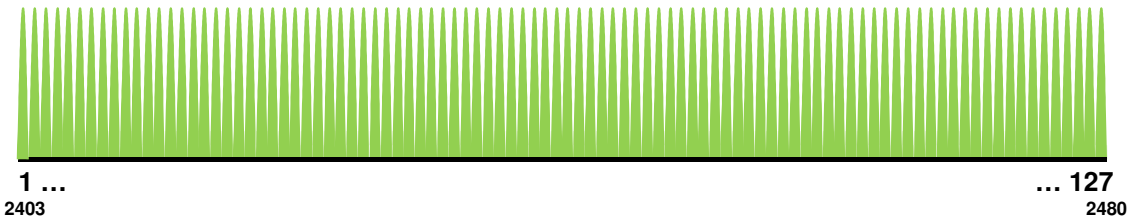
Bluetooth™

Canal
Frequência central (MHz)



TRUSTED
WIRELESS

Canal
Frequência central (MHz)



Comparaç o entre tecnologias

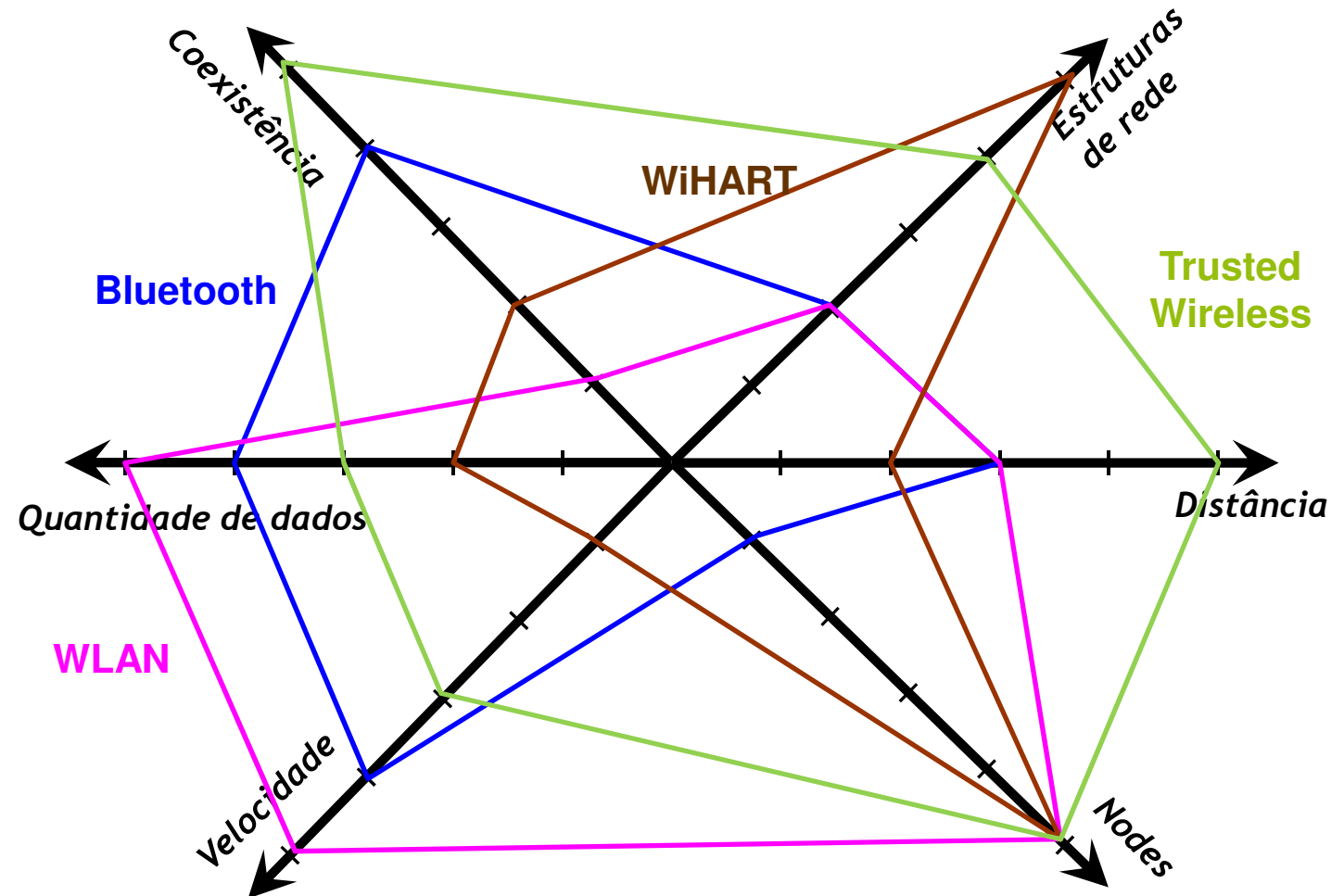
Legenda

 **Bluetooth**
*R pida, robusta,
pequenas redes*

 **Wi-Fi**
*R pida, grandes
quantidades de
dados, Ethernet*

 **WirelessHART**
*Rede de sensores,
muito lenta*

 **TRUSTED
WIRELESS**
Eficiente, robusta



Gama de produtos de comunicações sem fios da Phoenix Contact

- Wireless I/O

- Sinais digitais e analógicos

- Wireless Serial

- Comunicação série RS-232, RS-442 e RS-485



- Wireless Ethernet

- Ethernet

- Acessórios

- Antenas
- Cabos
- Protecções contra sobretensões

Wireless I/O: Sinais digitais e analógicos

Trusted Wireless I/O



- Despesas de instalação e de manutenção
- Mobilidade
- Despesas de transmissão
- Instalação e colocação em serviço imediato

Bluetooth I/O



- Configuração automática
- Redundância de canais de transmissão
- Imune a interferência
- Transmissão encriptada

Trusted Wireless I/O

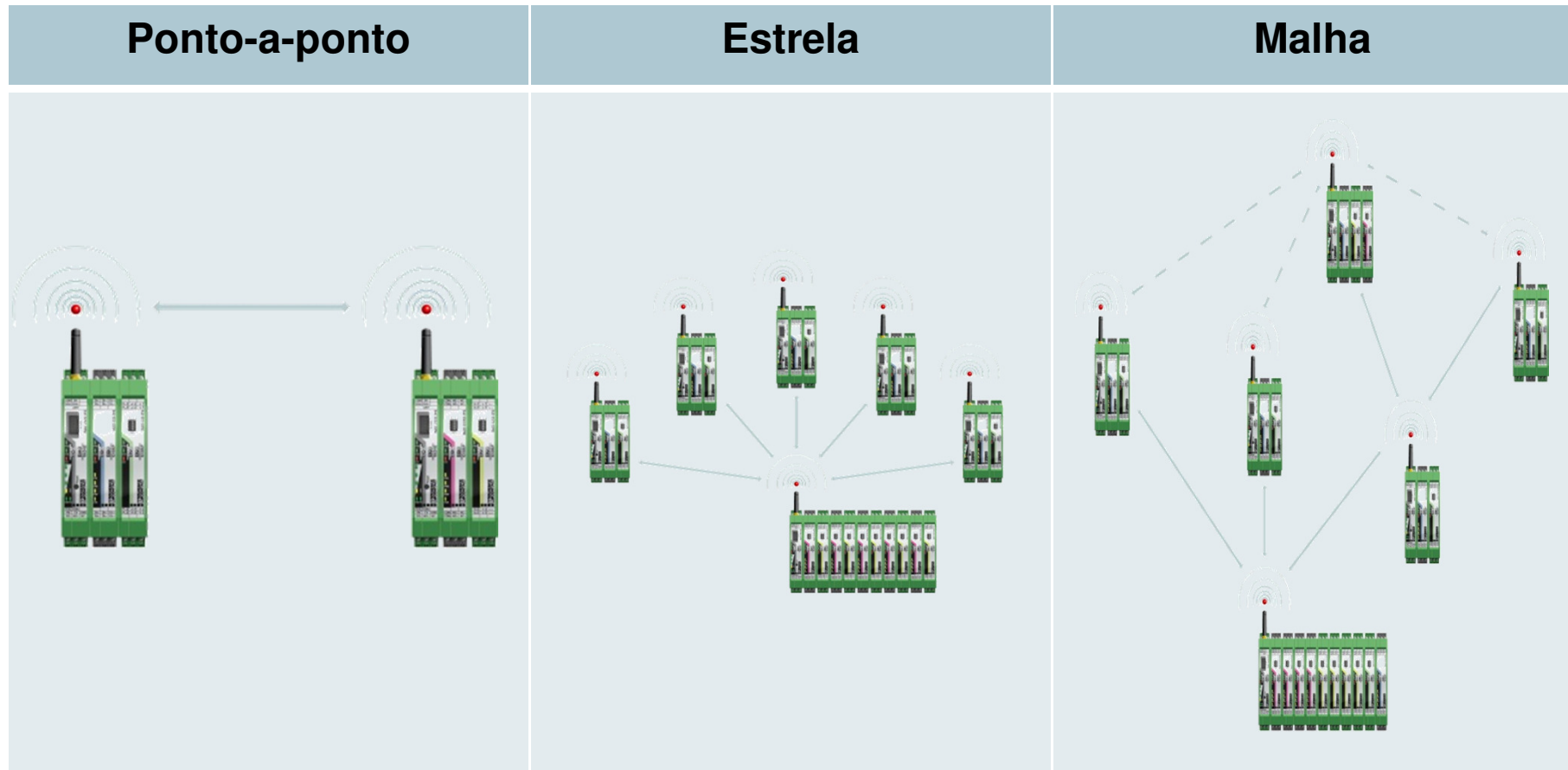
HIGH-LIGHT 2012

TRUSTED WIRELESS

Sinais digitais
0 ... 250 V AC/DC

Sinais analógicos
0 ... 20 mA, 4 ... 20 mA
0 ... 10 V, HART

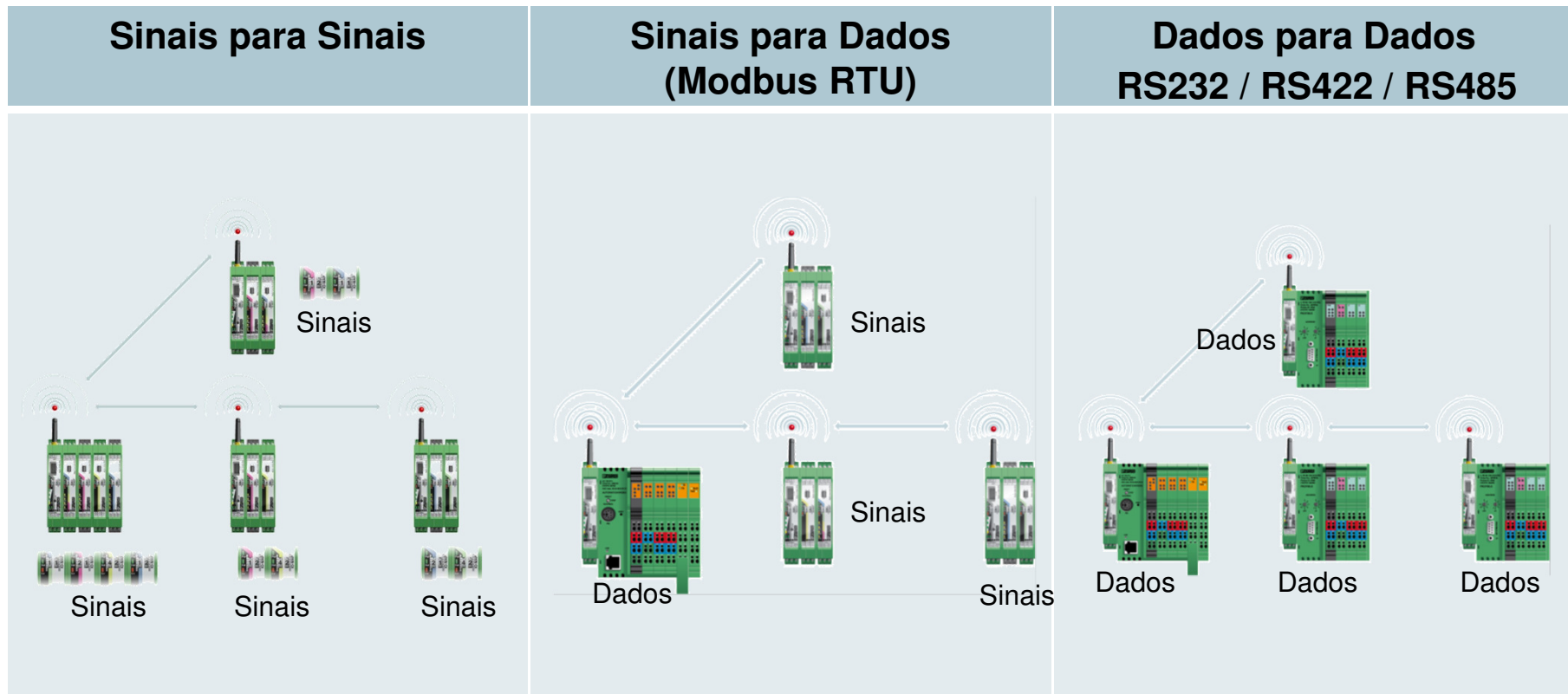
Topologias de rede



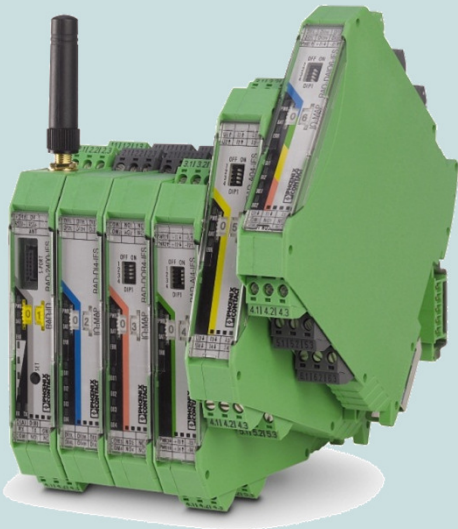
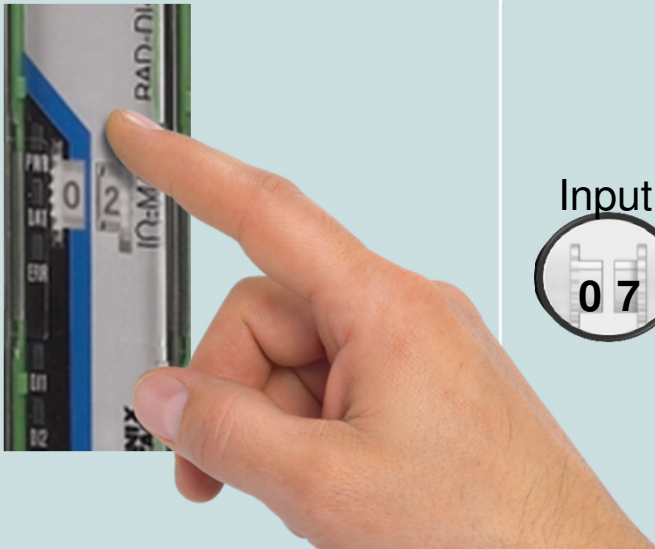
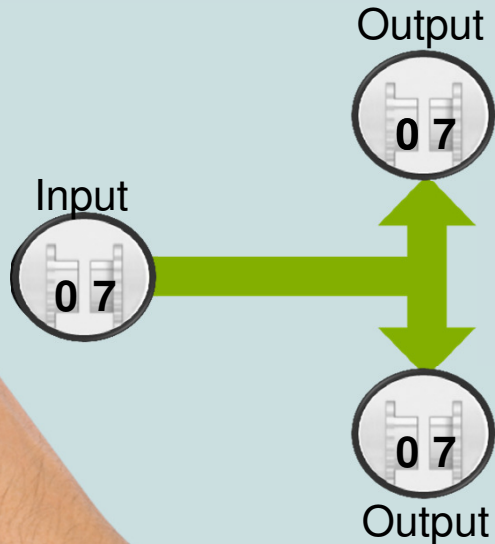
- Número máximo de nós: 250
- Velocidade de transmissão sem fios: 16 ... 500

kbps

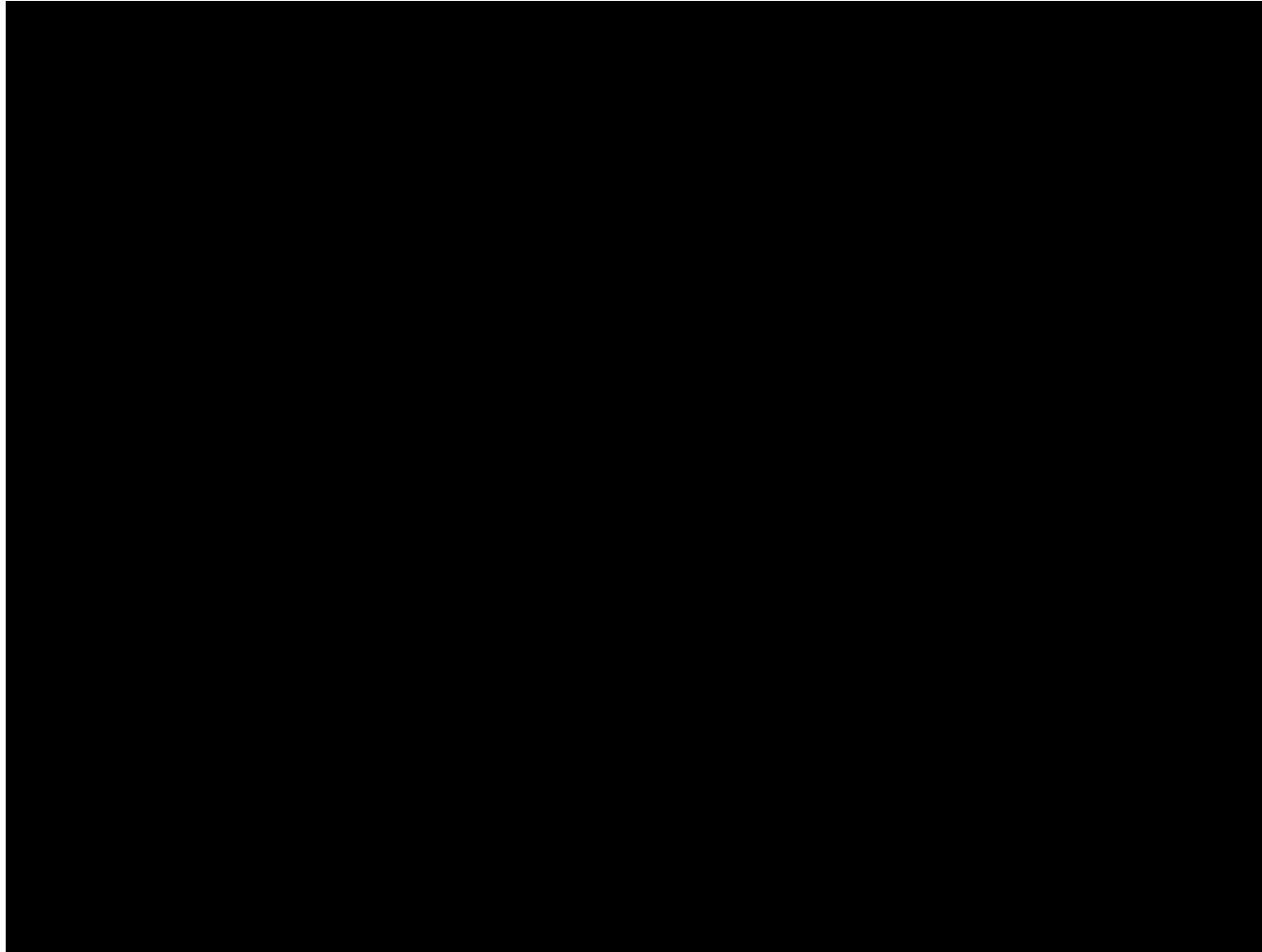
Transmissão de sinais e/ou dados



Instalação e configuração

| Instalação | Configuração | Relação Entrada - Saída |
|--|---|--|
|  |  |  |

Video de apresentação Radioline



Gama de produtos Truusted Wireless I/O



Wireless MUX



Sinais digitais
0 ... 24 VDC



Sinais analógicos
0 ... 20 mA, 4 ... 20 mA
0 ... 10 V

Gama de produtos Wireless MUX



Omnidirectional wireless set

ILB BT ADIO MUX-OMNI
Order No. 2884208

Panel wireless set

ILB BT ADIO MUX-PANEL
Order No. 2884509

Marine omnidirectional wireless set

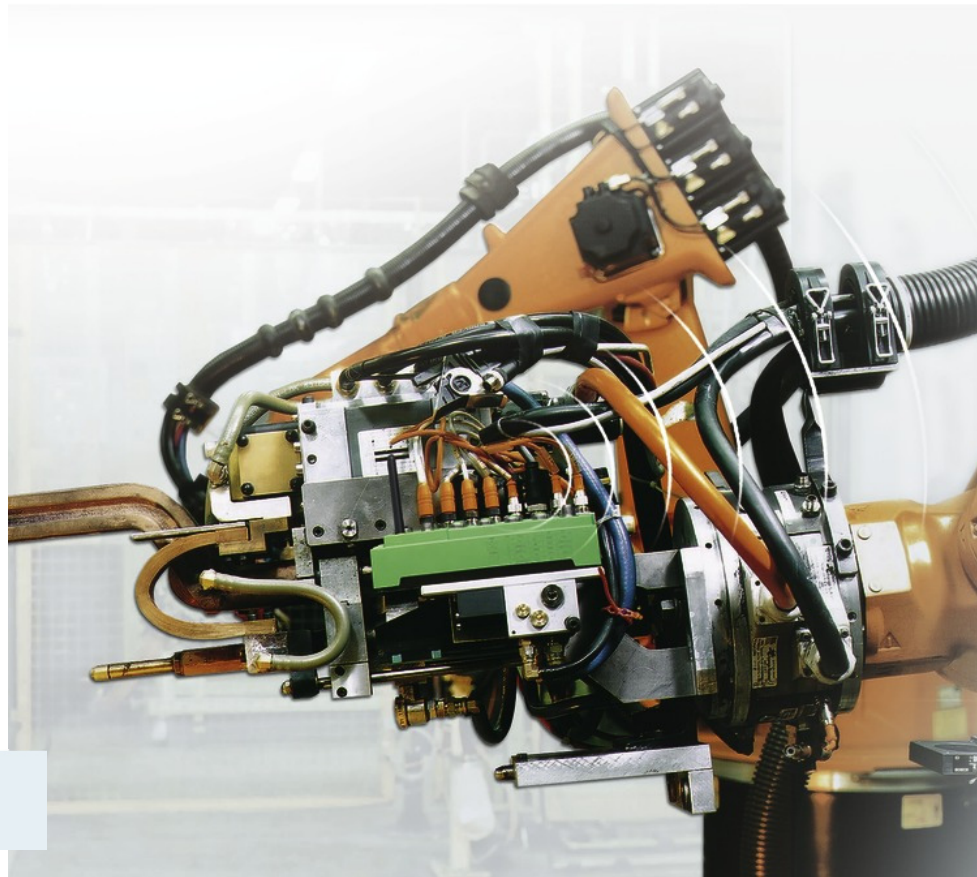
ILB BT ADIO MUX-OMNI 8/M
Order No. 2693185

GL Lloyd's Register DNV

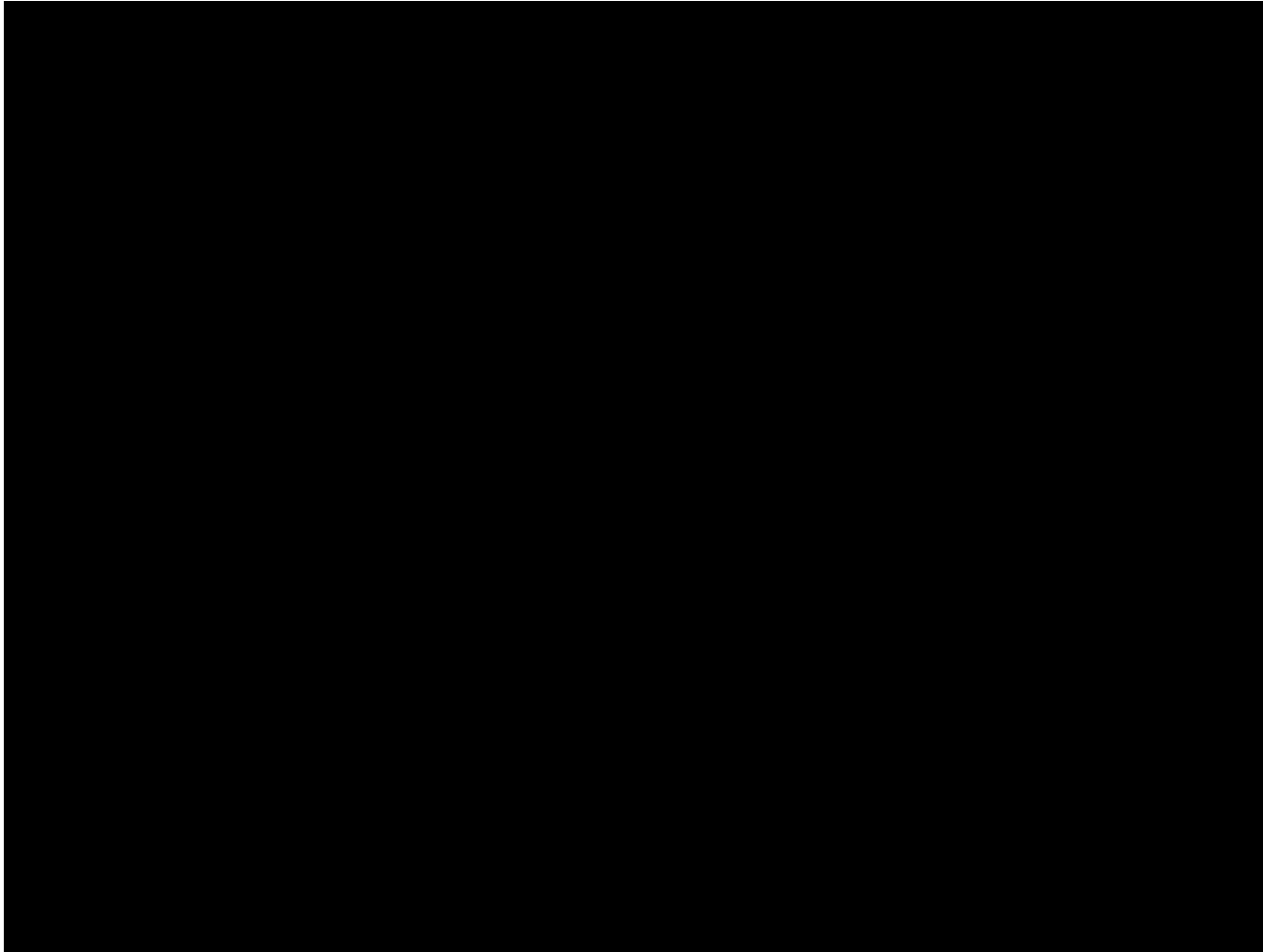
Bluetooth I/O



Sinais digitais
0 ... 24 VDC



Bluetooth I/O



Gama de produtos Bluetooth I/O



Seminário Técnico **Wireless Automation**

Intervalo

Industrial Wireless LAN



Normas IEEE 802.11 a/b/g/n



| Norma | Banda | Velocidade máxima |
|---------------|--------------------|-------------------|
| IEEE 802.11 b | 2,4 GHz | 11 Mbps |
| IEEE 802.11 g | 2,4 GHz | 54 Mbps |
| IEEE 802.11 a | 5 GHz | 54 Mbps |
| IEEE 802.11 n | 2,4 GHz e/ou 5 GHz | 600 Mbps |

Tecnologia MiMo

MiMo: Multiple Input, Multiple Output

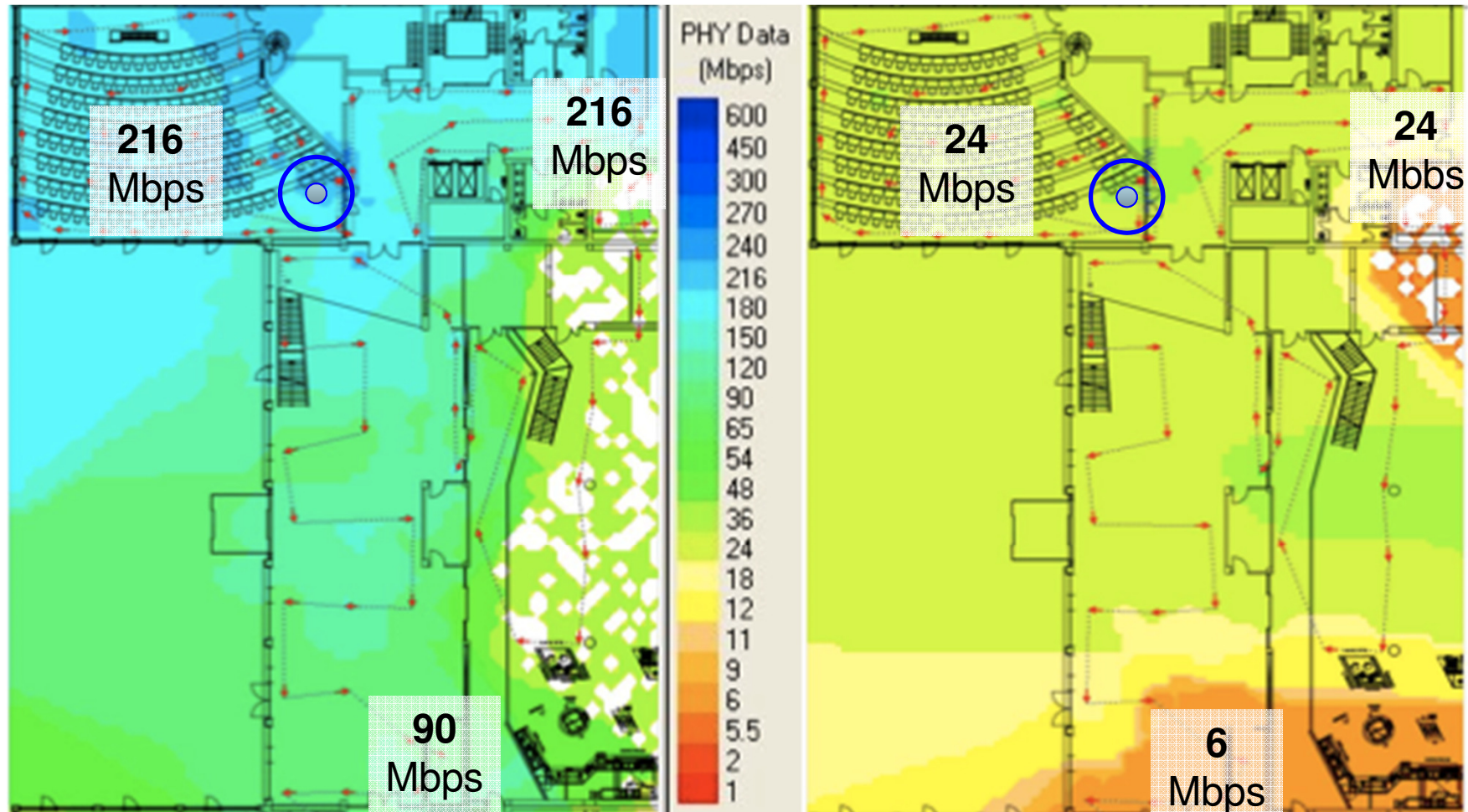


3 x Antenas
3 x Emissores
3 x Receptores

Funções das antenas

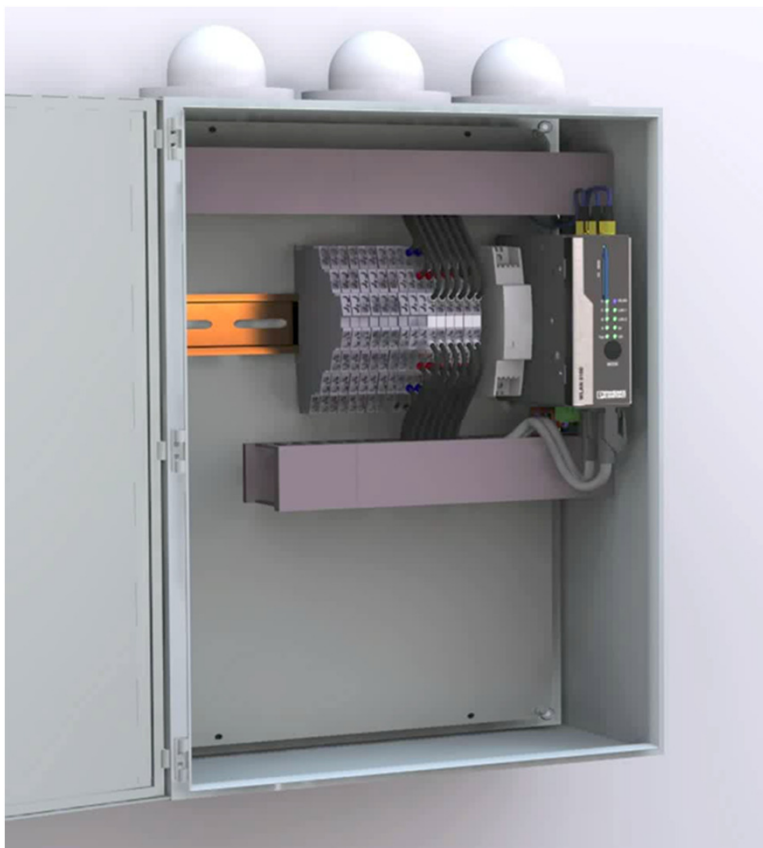


Exemplo de cobertura com tecnologia MiMo





Transmissão de dados em Mbps. Medição realizada com pela AirMagnet Site Survey Tool

Instalação em quadro eléctrico



Configuração do ponto de acesso



FL WLAN 5100

Information
Help & Documentation
Device Status
Interface Status
Alarm & Events
Connected Devices

Configuration
Quick Setup
Network
WLAN
Advanced WLAN
Service
System

Diagnostics
System Events

Quick Setup

Web management language (?) English

IP Address Assignment (?) bootp

Country (Regulatory Domain) (?) Germany

Operating Mode (?) Accesspoint ☒ Indoor

Network SSID (?) PxC

WLAN Band (?) 5Ghz(802.11 a/n)

Channel (?) Indoor Ch.36

WLAN Security (?) WPA2-PSK (AES)

Passkey (?) ☐ Show cleartext passphrase

Administrator Password (?)

Retype Password (?)

Revert Apply Apply&Save

Pontos de acesso e clientes WLAN

Pontos de acesso

| | |
|--|---|
|  |  |
| WLAN 5100 access point – IEEE 802.11 a/b/g/n | WLAN access point – IEEE 802.11 a/b/g |
| FL WLAN 5100 Order No. 2700718 | FL WLAN 24 AP 802-11 Order No. 2884075 |
| FL WLAN 5101 Order No. 2701093 | FL WLAN 24 DAP 802-11 Order No. 2884279 |
| SD-FLASH 256 MB Order No. 2988120 | FL WLAN 230 AP 802-11 Order No. 2884444 |

Clientes

| | | |
|---|--|--|
|  |  |  |
| WLAN Ethernet adapter – 2.4 GHz | WLAN Ethernet adapter – 5 GHz | WLAN Ethernet adapters – external antennas |
| FL WLAN EPA Order No. 2692791 | FL WLAN EPA 5N Order No. 2700488 | FL WLAN EPA RSMA Order No. 2701169 |
| | | FL EPA RAIL MOUNTING SET Order No. 2701133 |
| | | FL EPA WALL MOUNTING SET Order No. 2701134 |

Seminário Técnico **Wireless Automation**

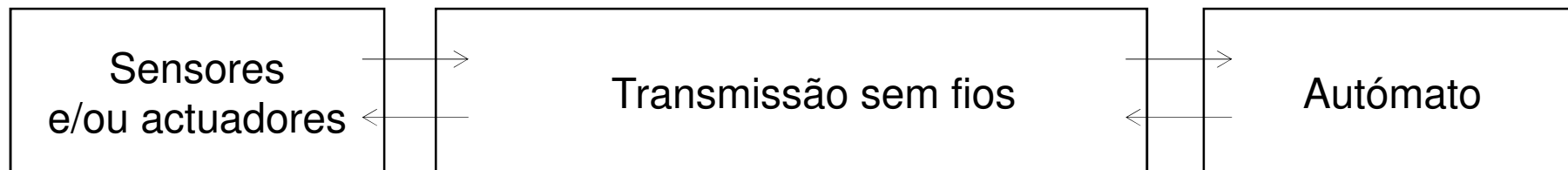
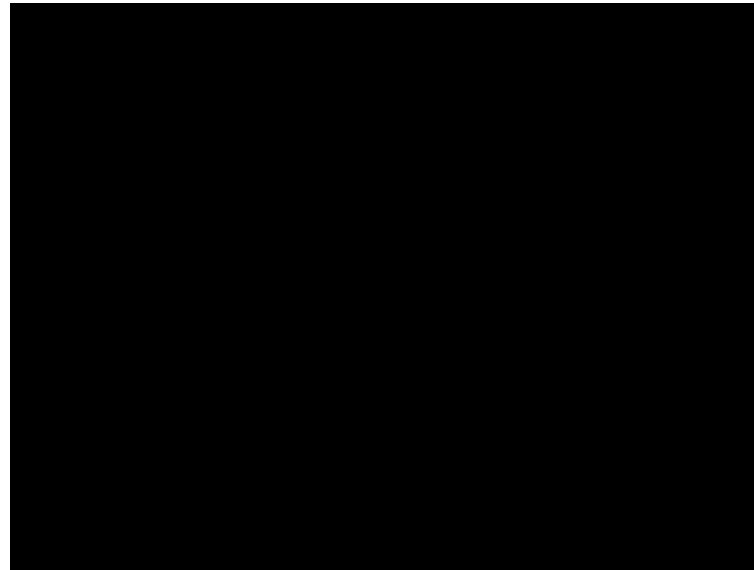
Case Studies

1

Transmissão de estados e comandos entre partes fixas e partes móveis de uma máquina

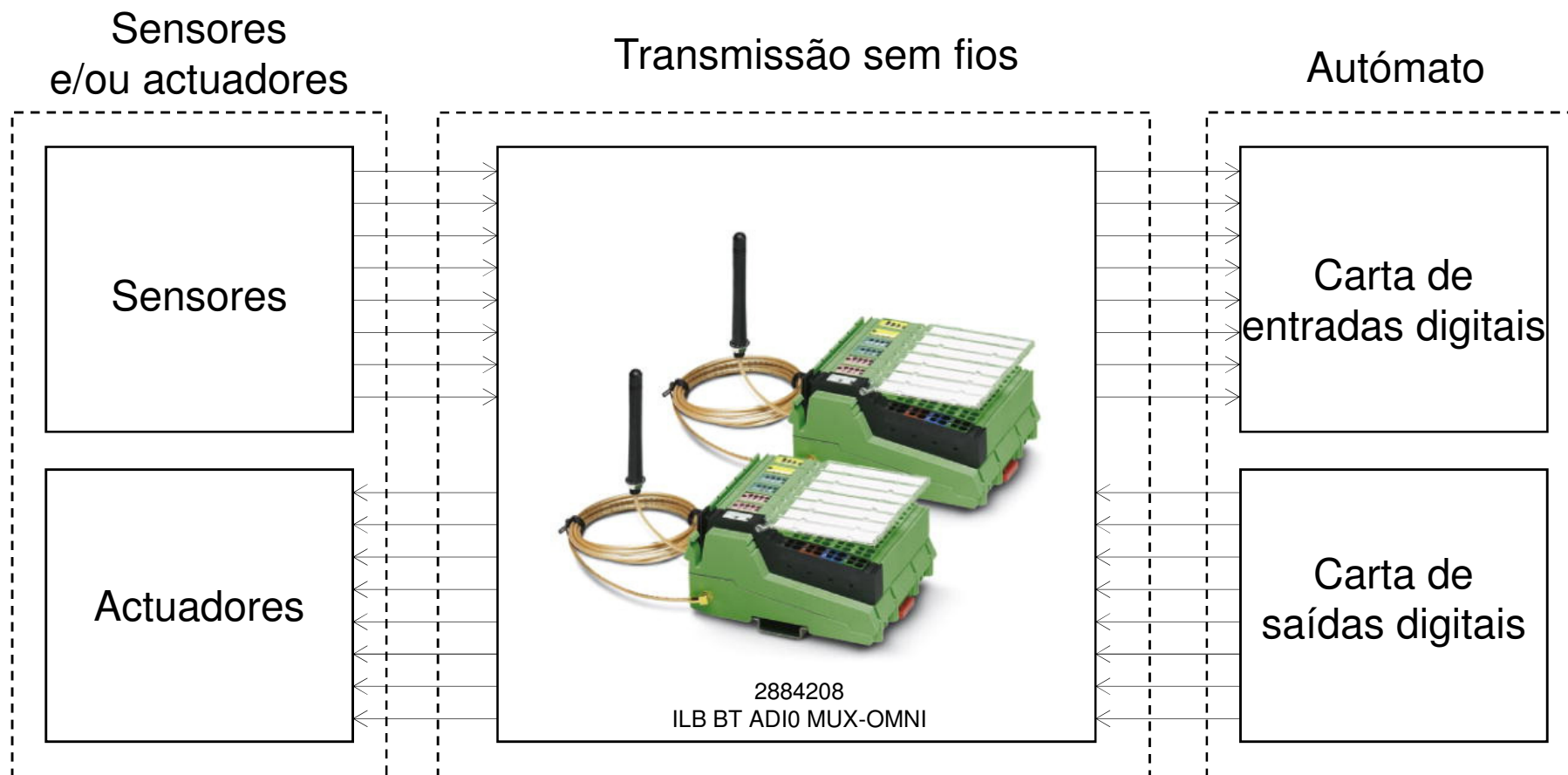


Prensa, barras laterais



10 ms

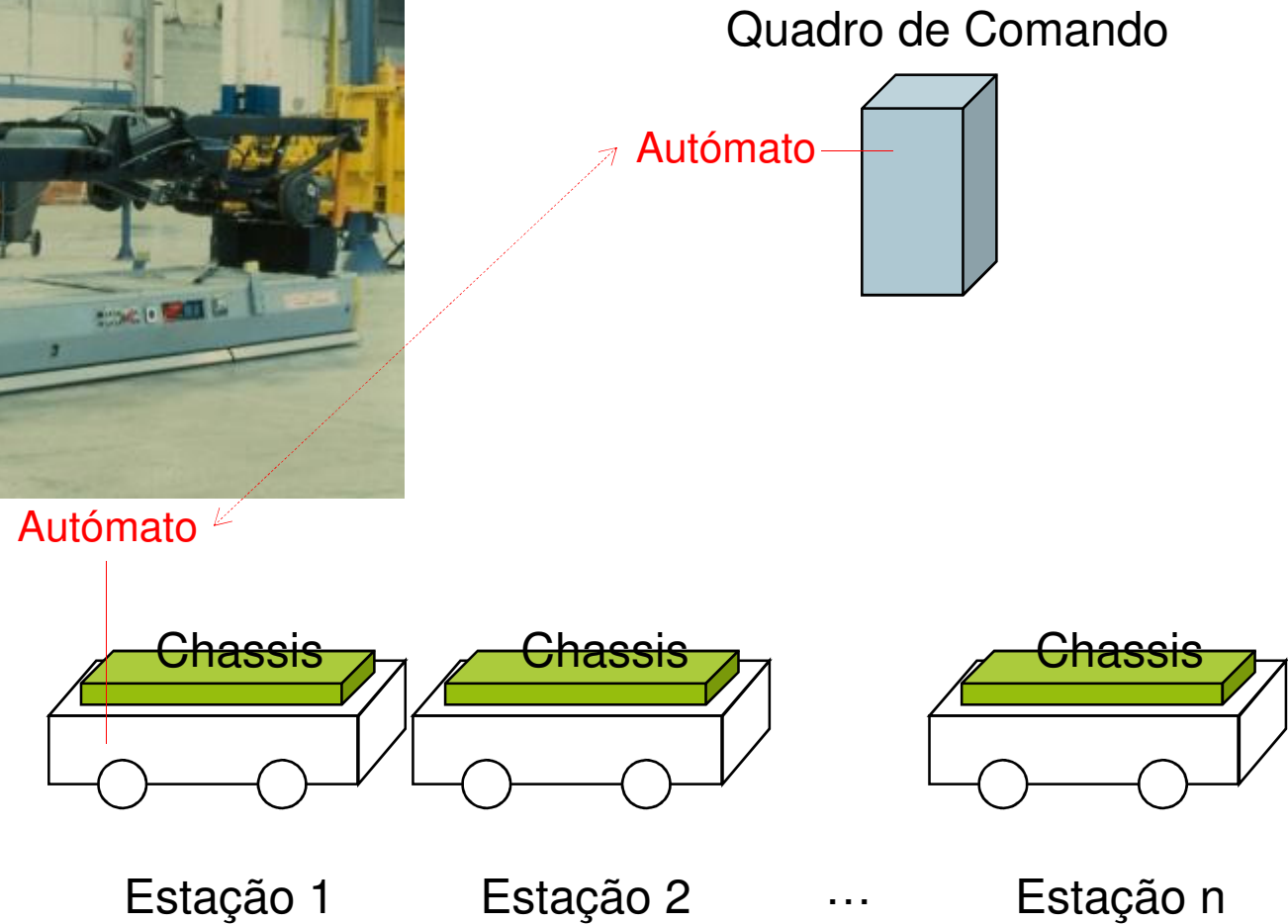
Transmissão sem fios dos sinais dos sensores e dos actuadores



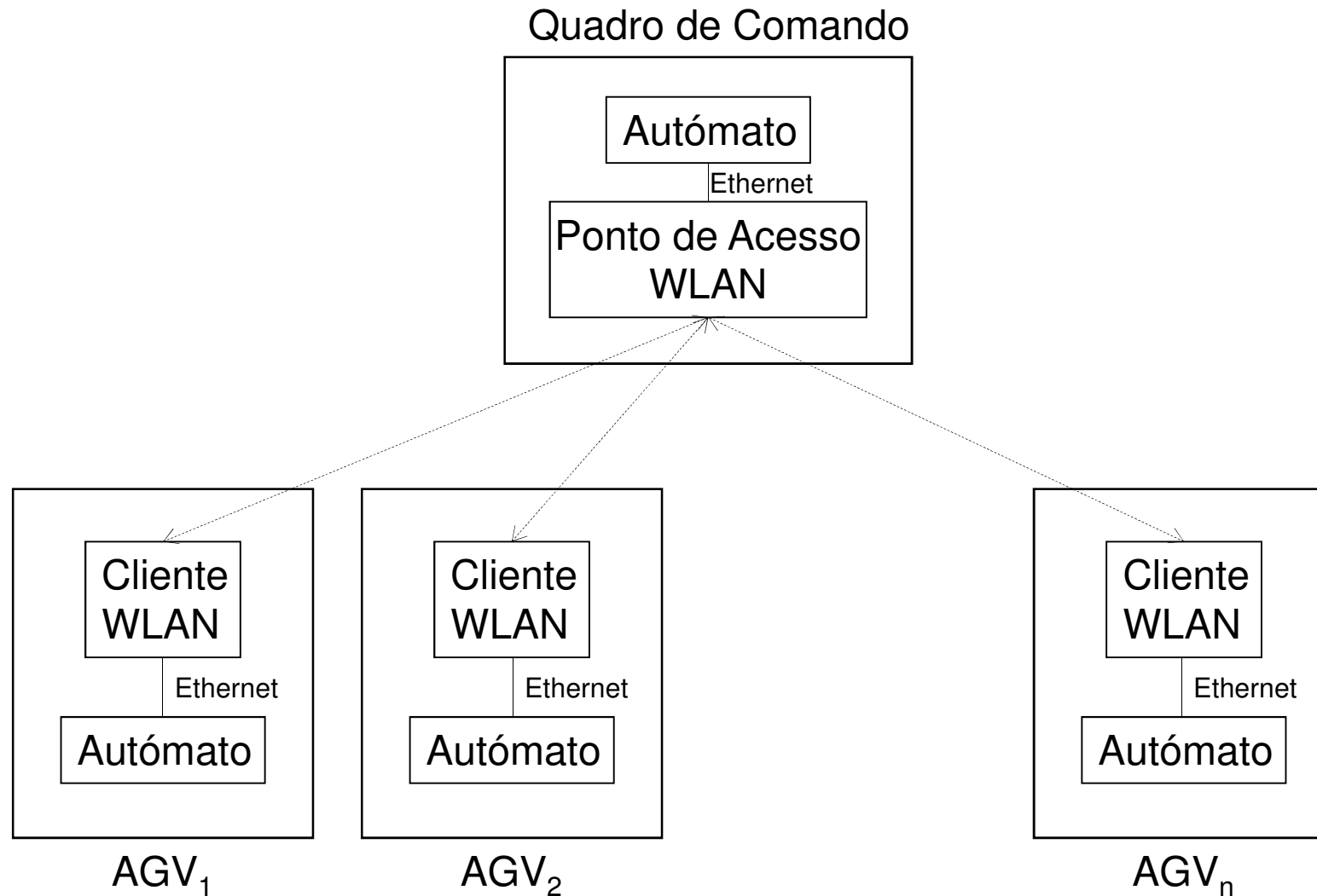
2

Controlo de um AGV Automatic Guide Vehicle

Montagem do chassis de um automóvel



Comunicação entre Quadro de Comando e AGV's



Ponto de acesso e cliente sem fios

Quadro de Comando



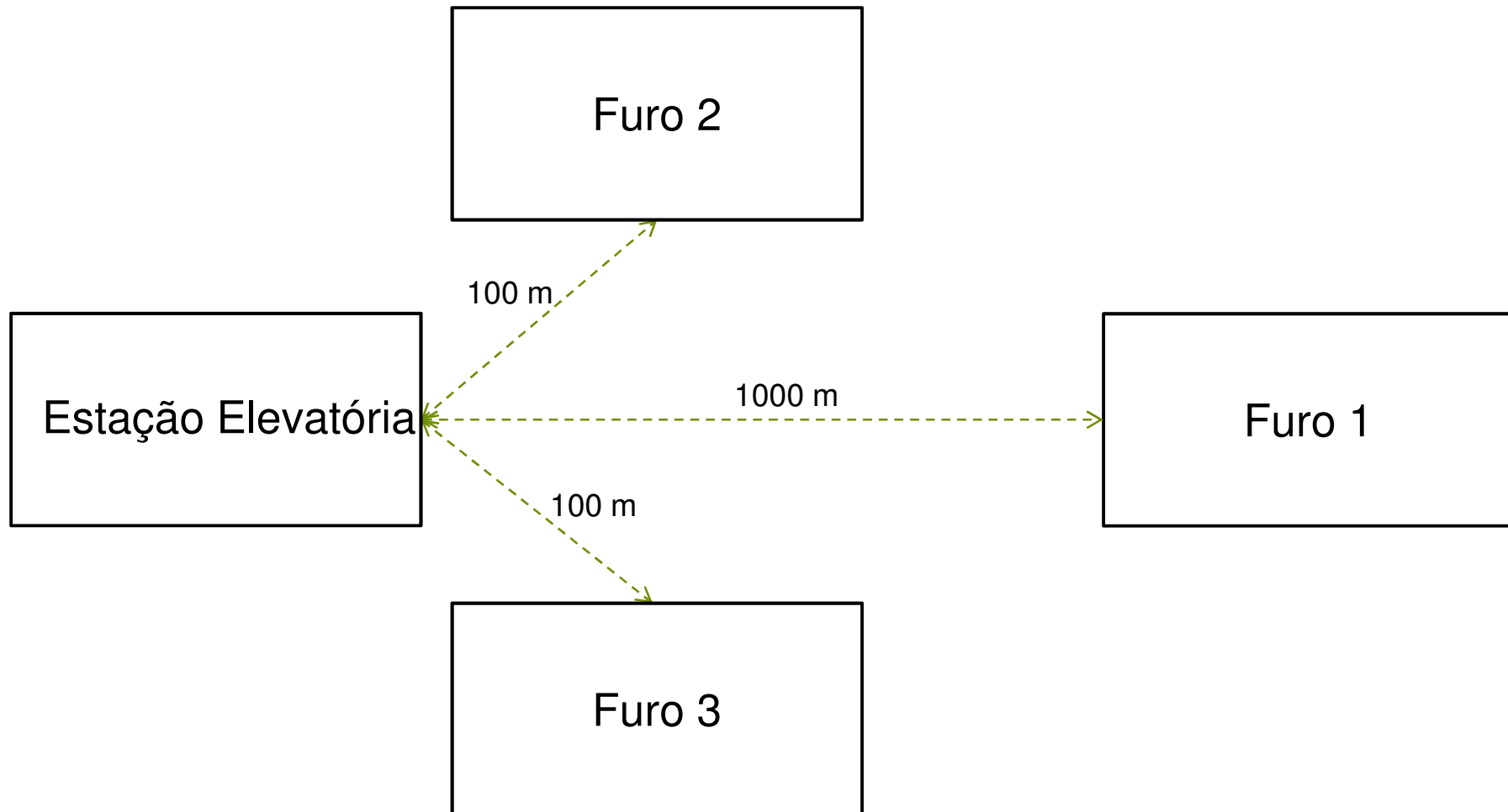
AGV



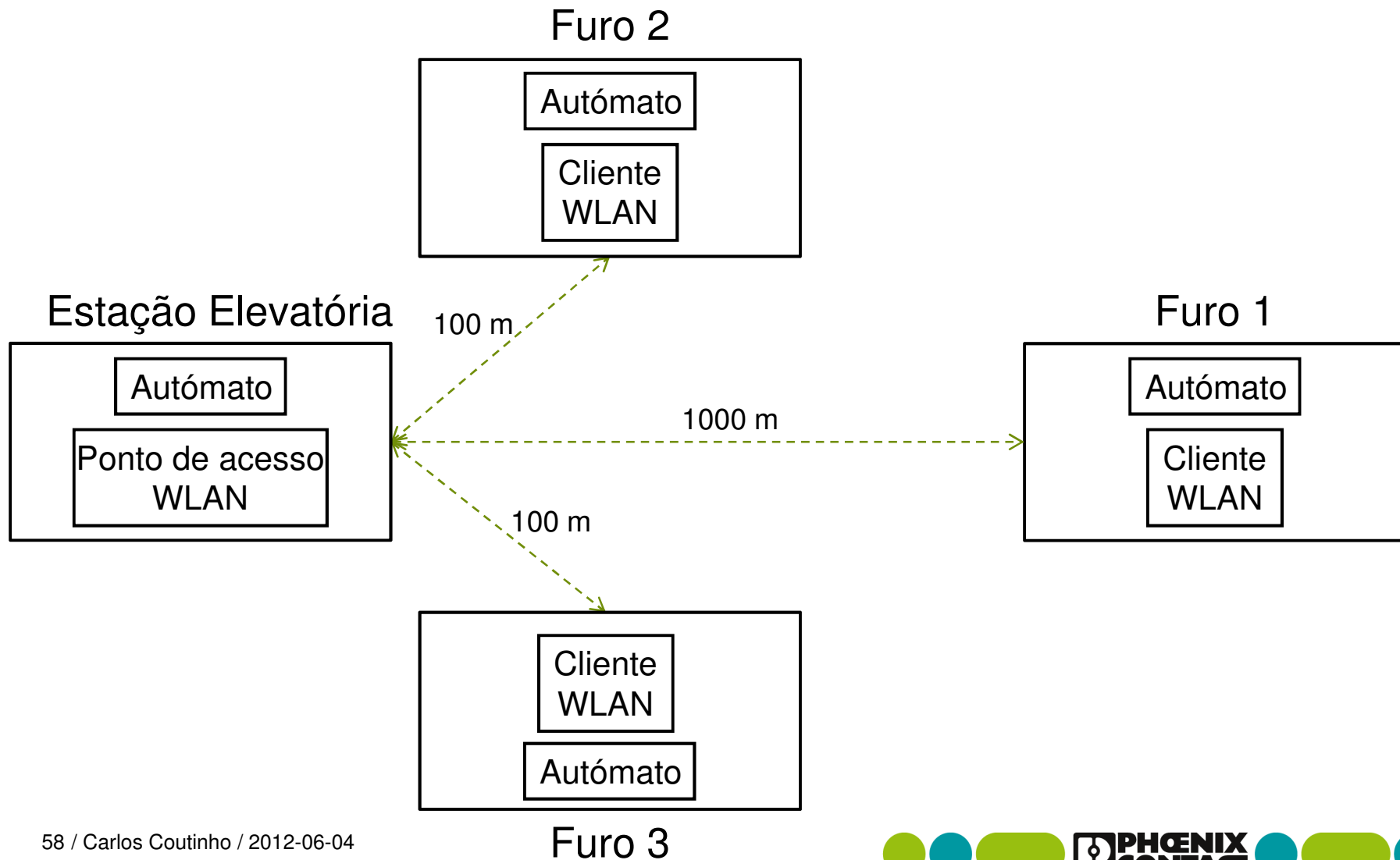
3

Captação e bombagem de água

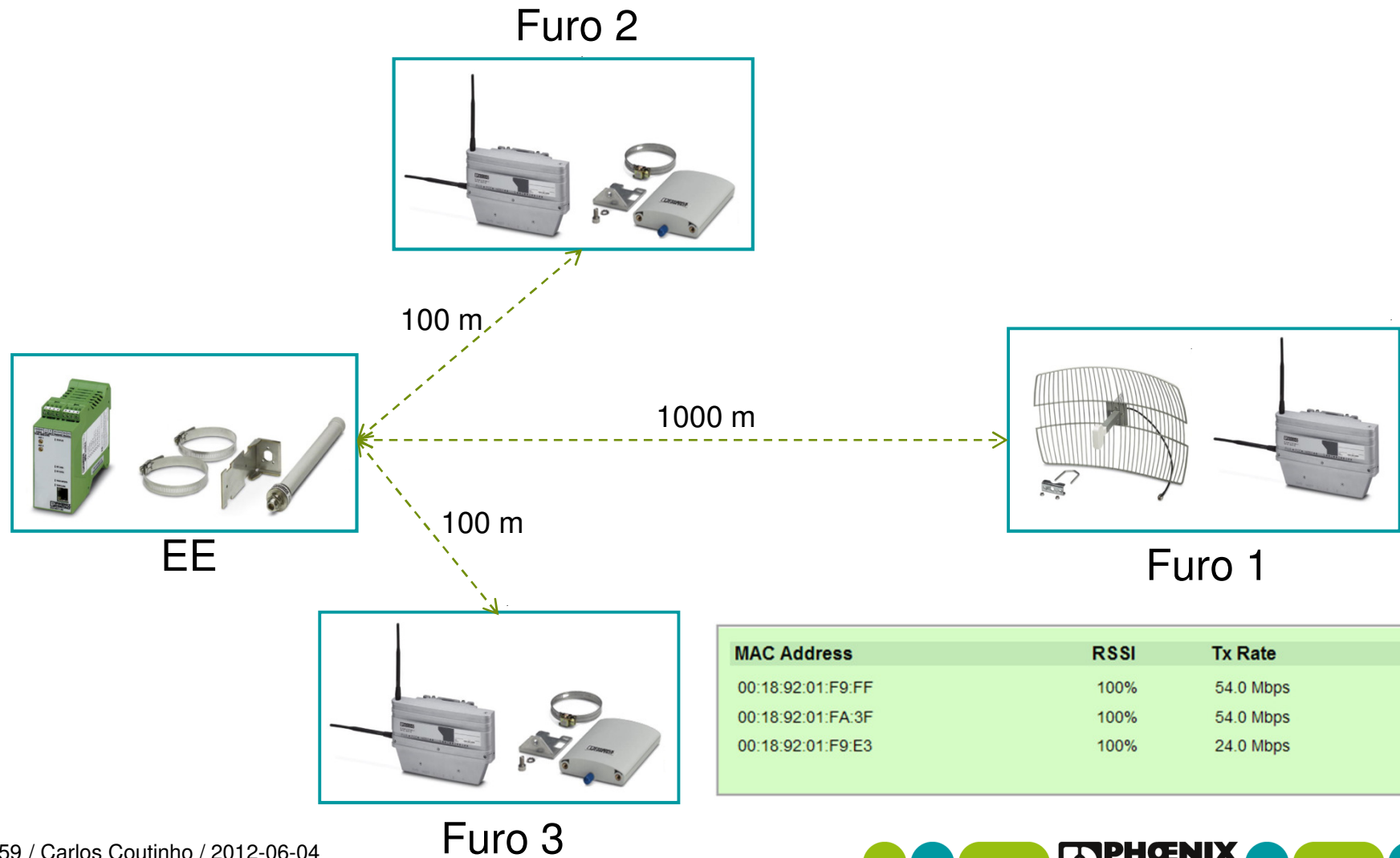
Localização dos furos e da estação elevatória



Localização dos furos e da estação elevatória



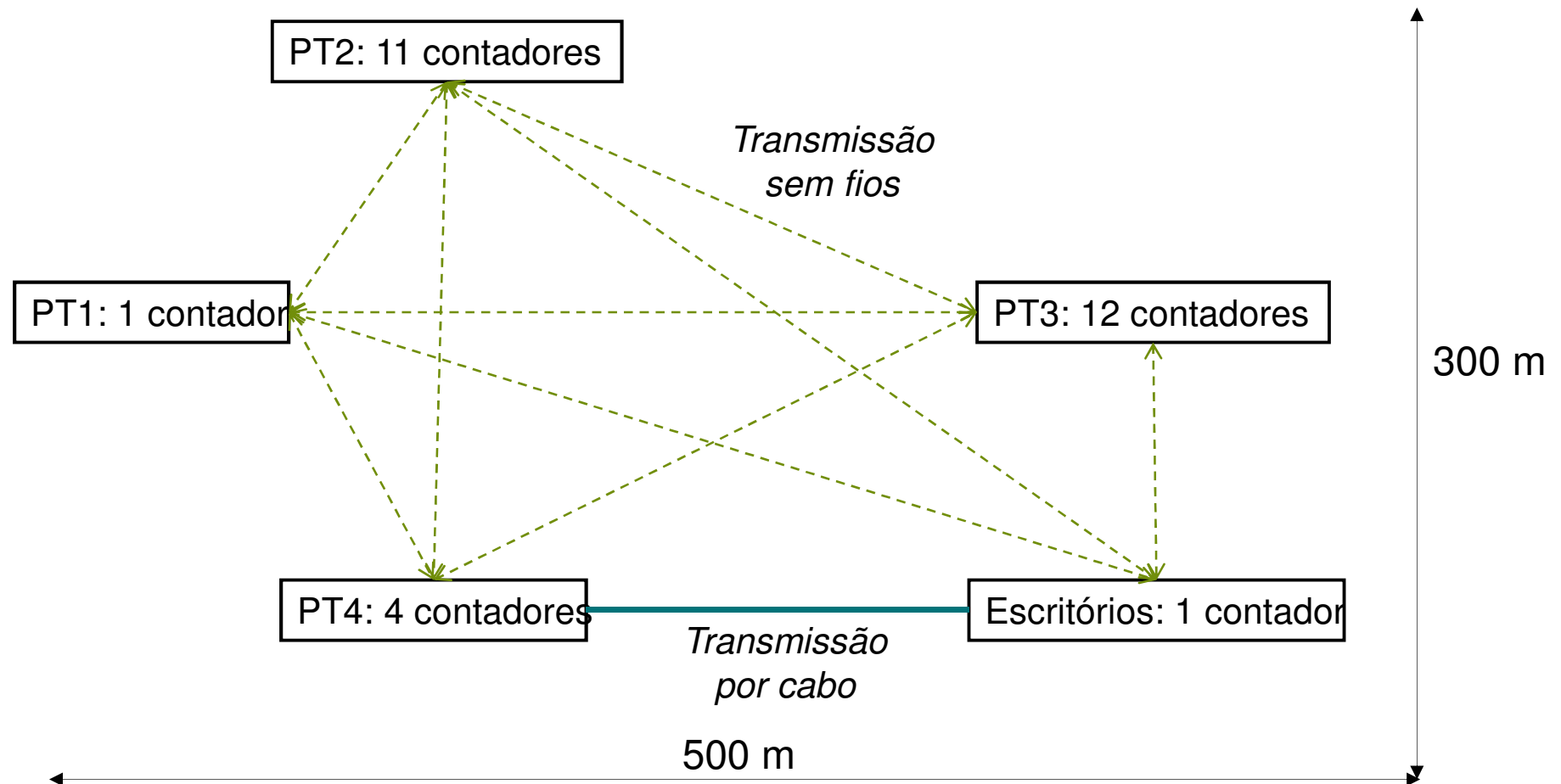
Ponto de acesso e clientes WLAN



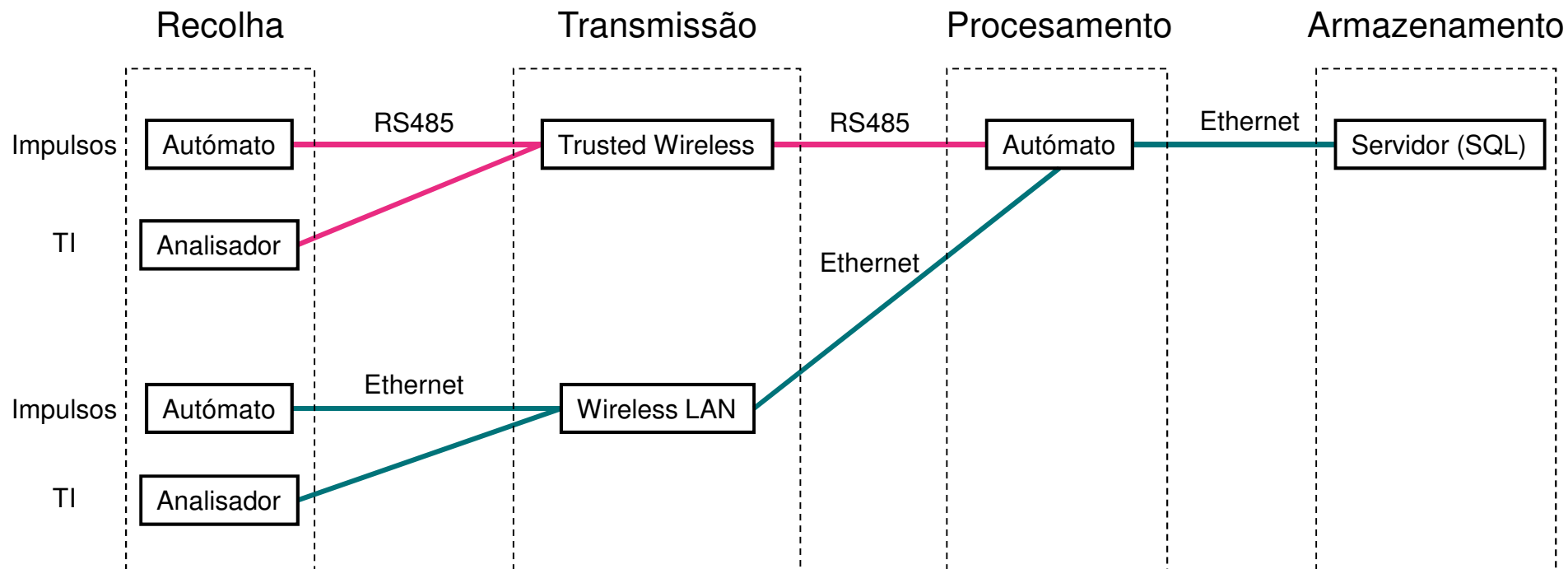
4

Rede de aquisição e armazenamento de dados do consumo de energia

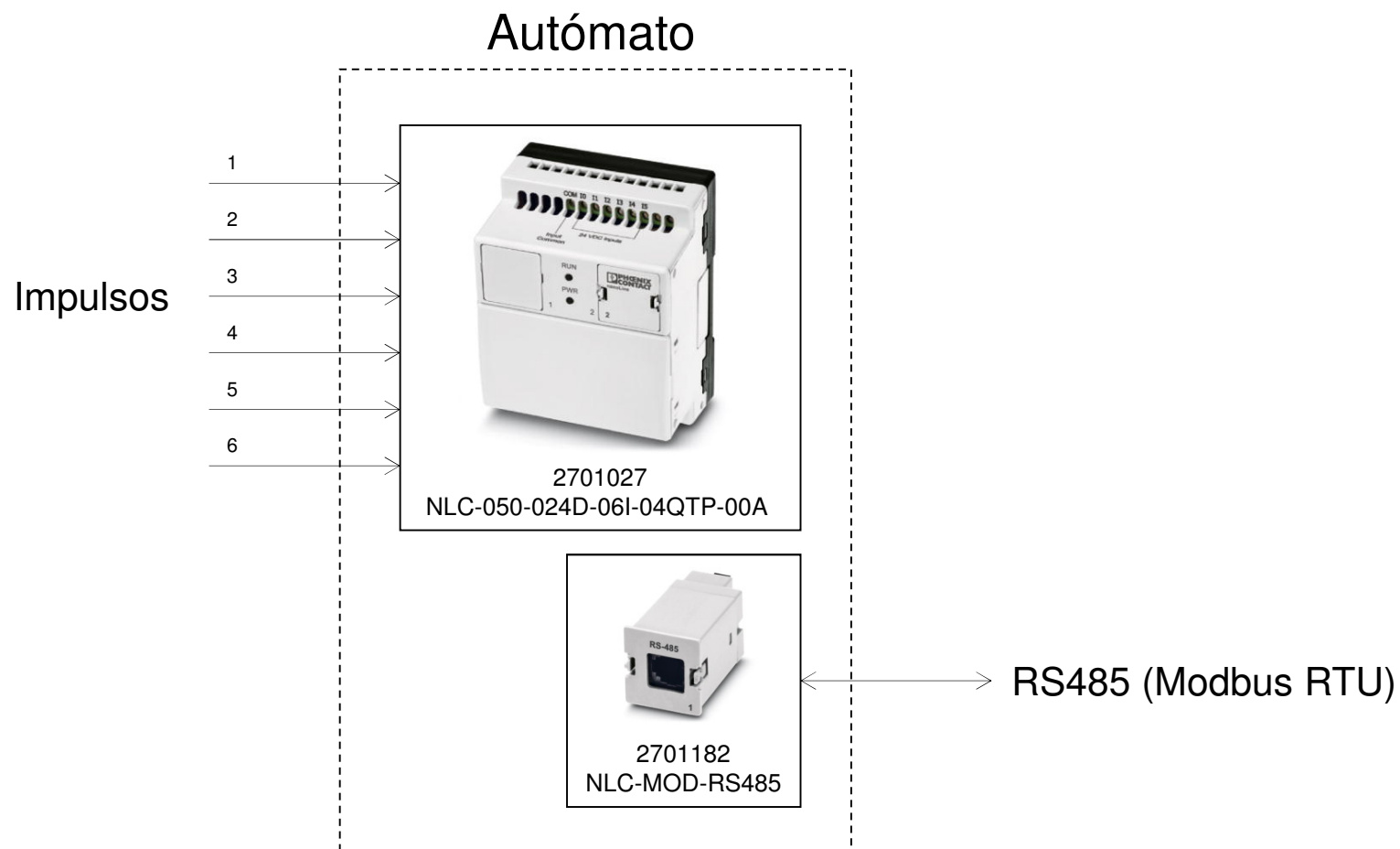
Localização dos pontos de recolha e tipos de transmissão



Categorias funcionais



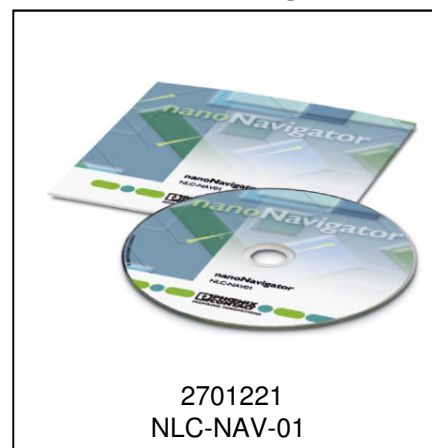
Recolha de impulsos e porta de comunicação por RS485 (Mosbus RTU)



Software de programação do autómato de contagens de energia



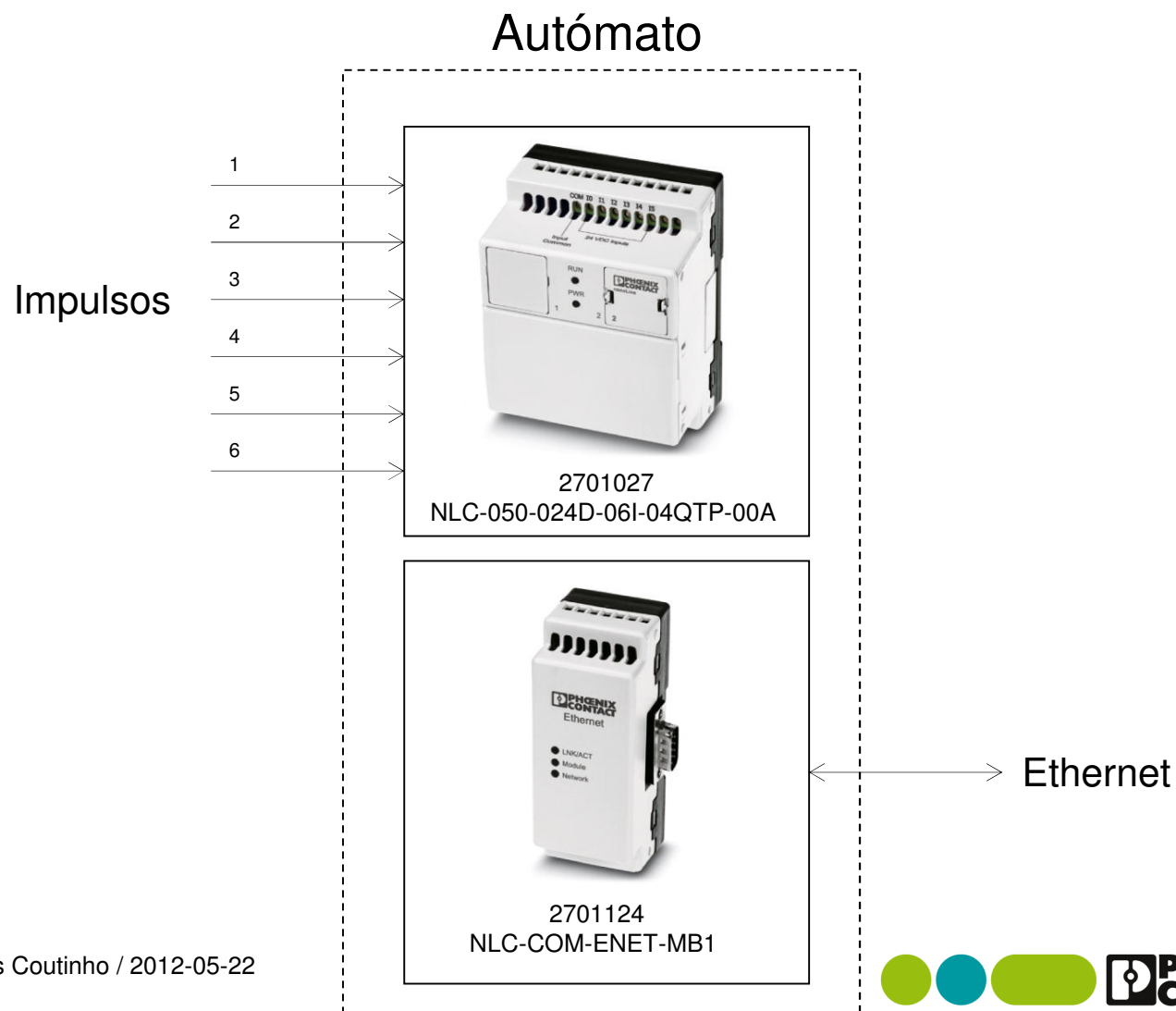
nanoNavigator



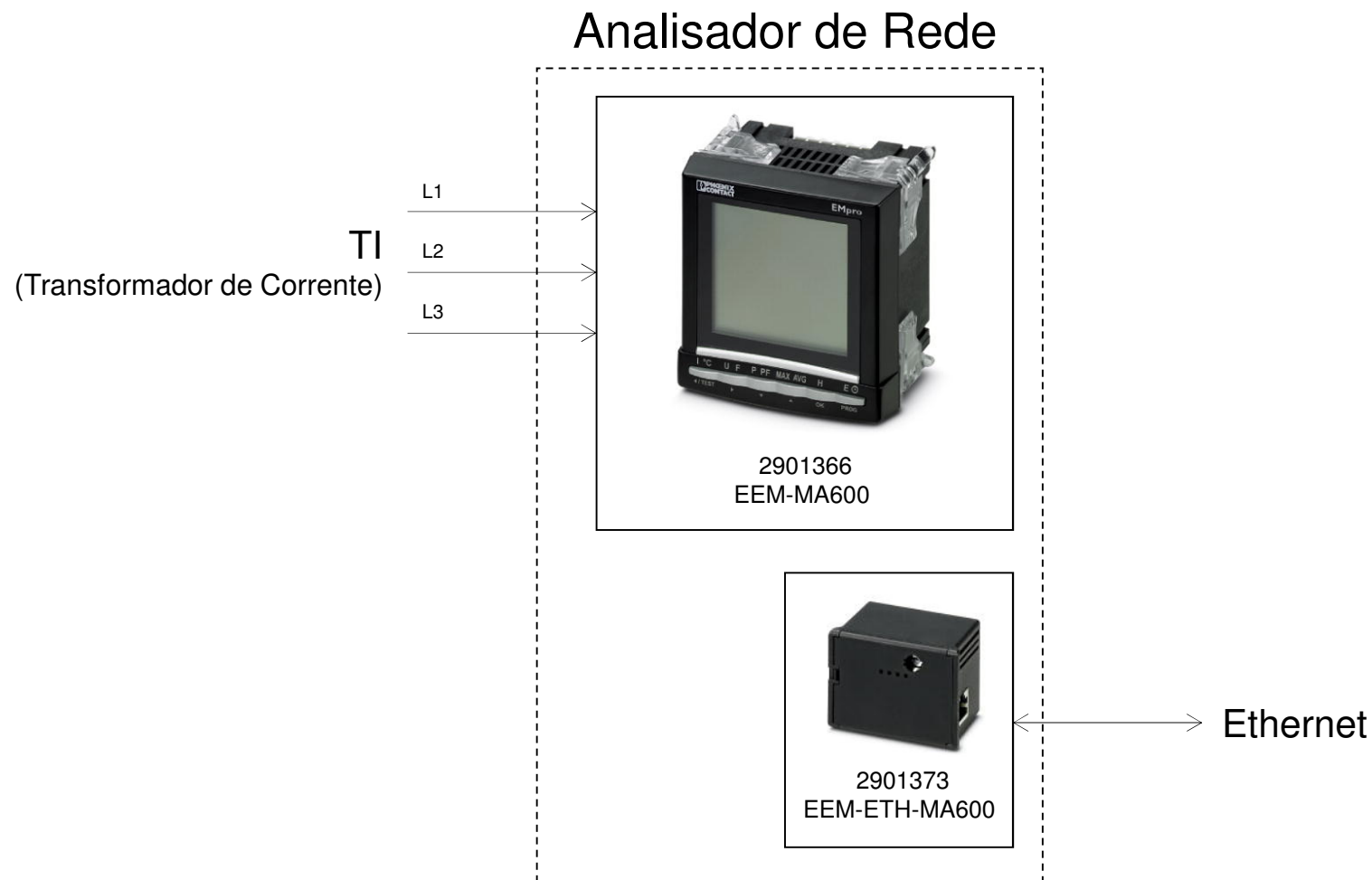
Medição de grandezas eléctricas e porta de comunicação RS485 (Modbus RTU)



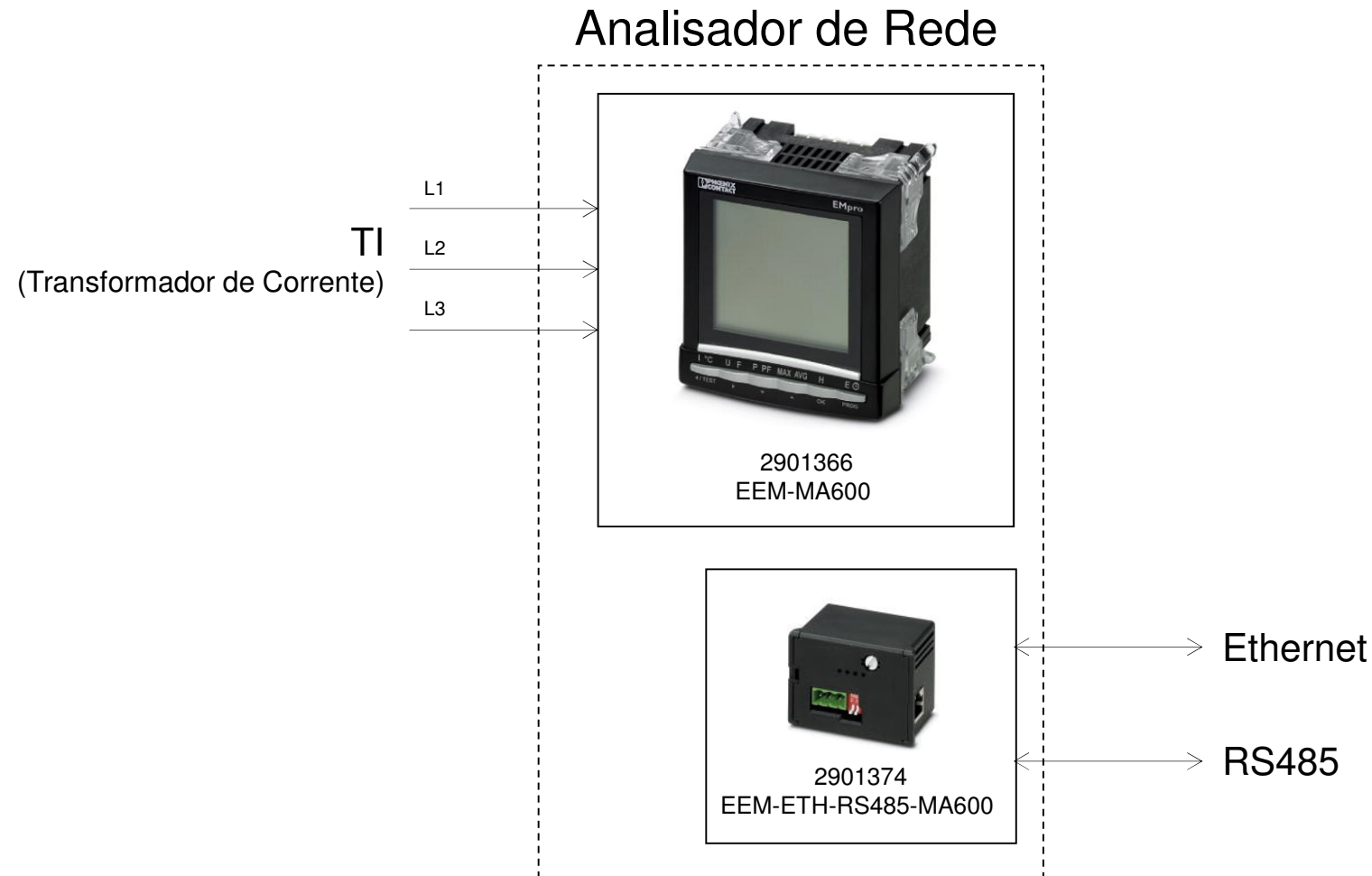
Recolha de impulsos e porta de comunicação por ethernet (Modbus TCP)



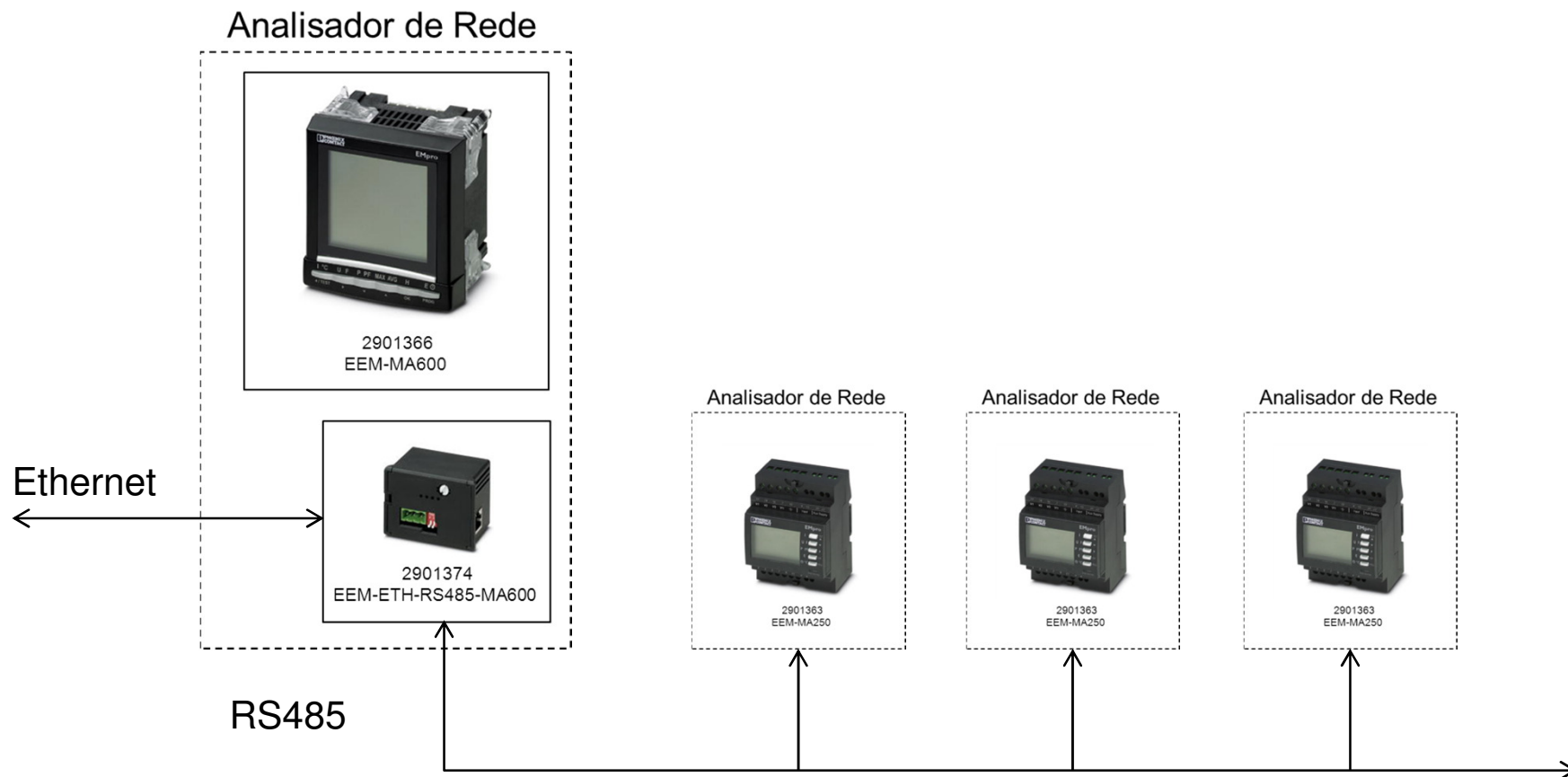
Medição de grandezas eléctricas e porta de comunicação Ethernet (Modbus TCP)



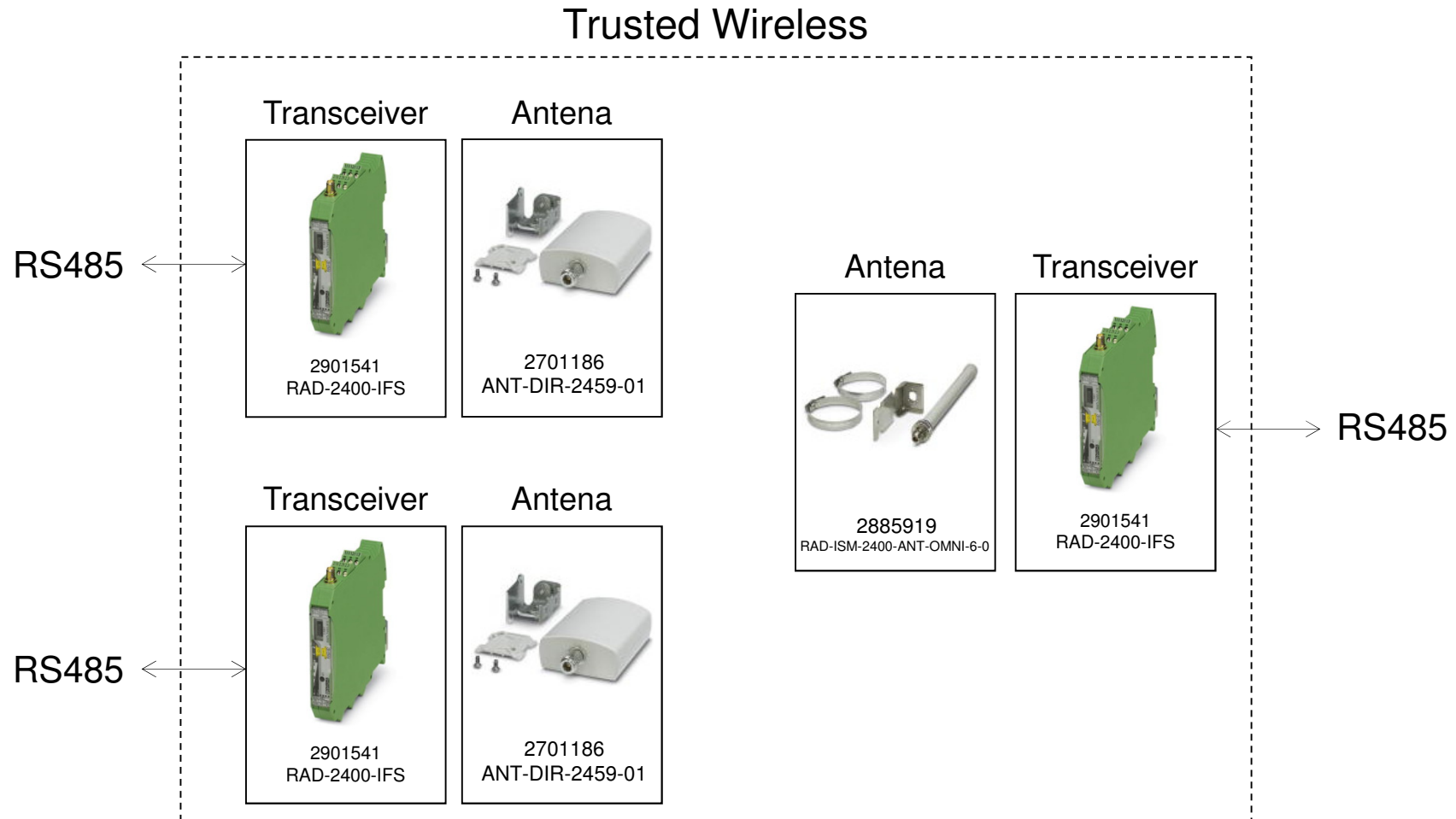
Medição de grandezas eléctricas e *gateway* RS485/Ethernet



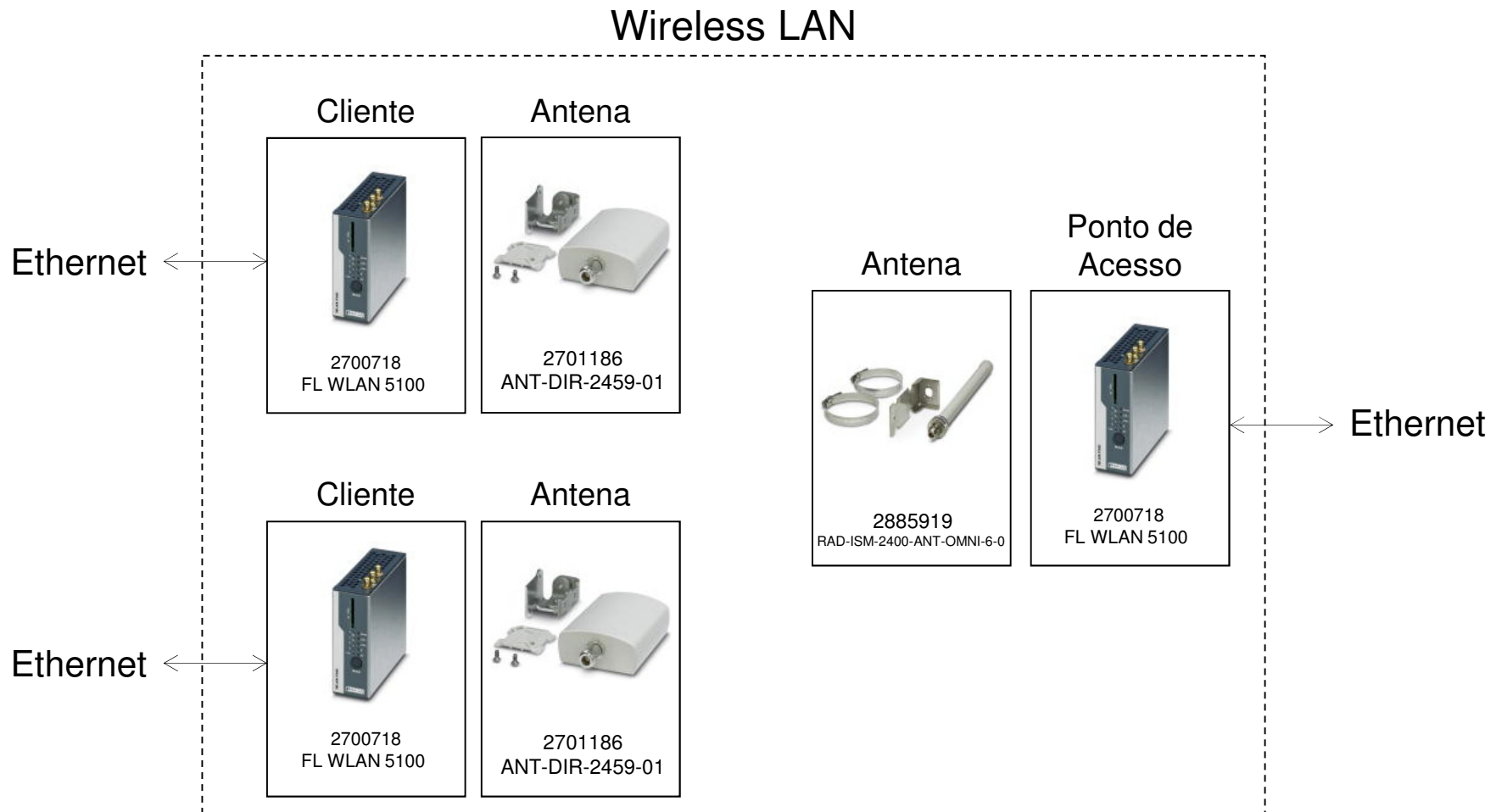
Topologia de analisadores com a *gateway* RS485/Ethernet



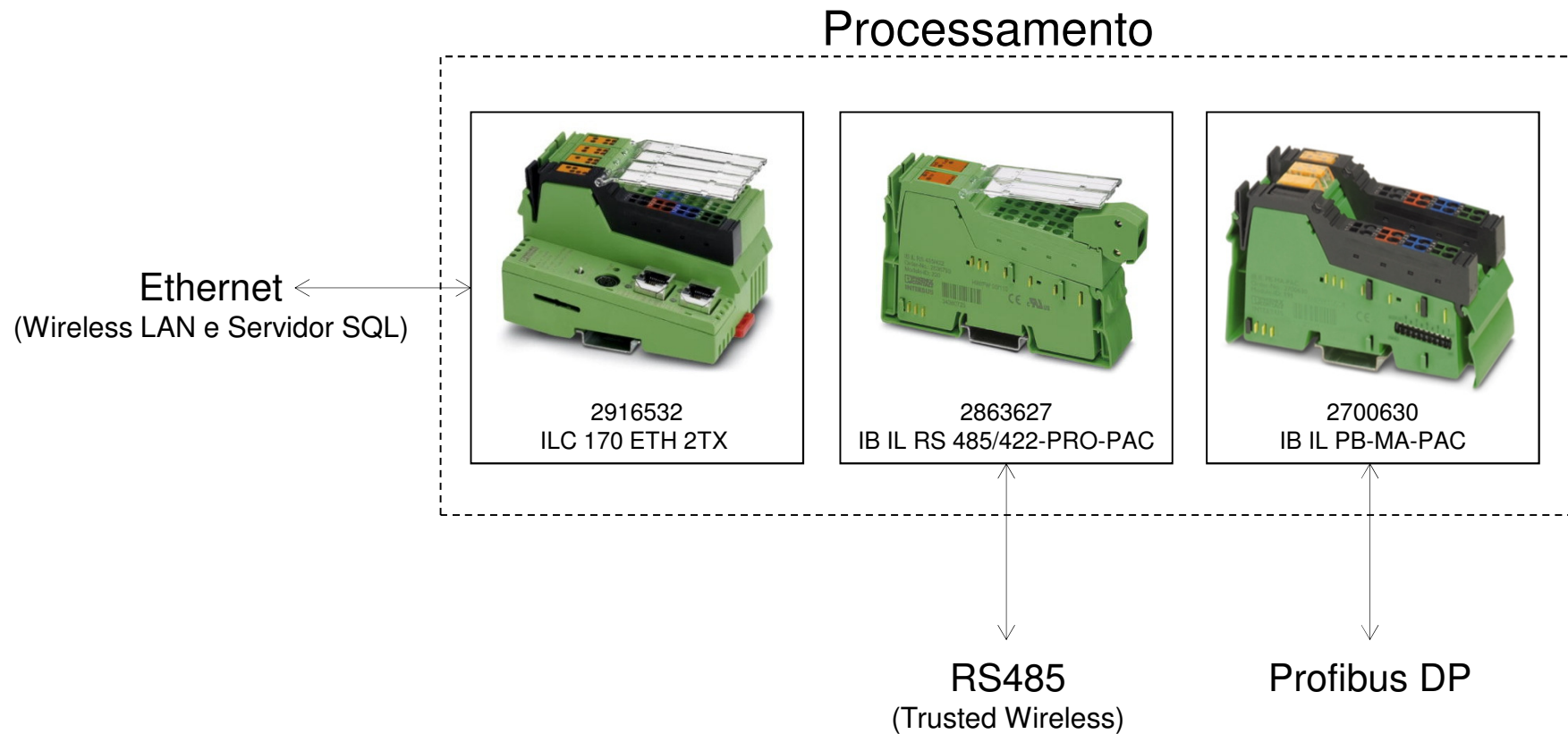
Transmissão Trusted Wireless



Transmissão Wireless LAN



Processamento de dados



Softwares e livrarias do automático de processamento de dados

Recolha de dados
Comunicações
Comandos SQL



Visualização



Livrarias
(inclui Modbus e SQL)



Fluxo de dados

