

Telegesis ZigBee technology

What is ZigBee and what does it do?

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What is ZigBee and where does it fit?

ZigBee is low power, low data-rate, medium range wireless technology. It has the capacity to form self-healing, mesh networks and it is designed to fit a specific slot in the overall landscape of wireless technology available to developers. It has a published data rate of 250kbps – but this figure has to include all the ZigBee overhead in terms of addressing, timing, retries and so on.

The usable throughput with ZigBee PRO technology is about 20-30kbps depending upon application.

Thus ZigBee does not compete with Bluetooth, Wi-Fi or its 802.11b/g/a variants and was never intended to do so. ZigBee provides a specific set of functionality that suits it uniquely to wireless low data collection and control functions.

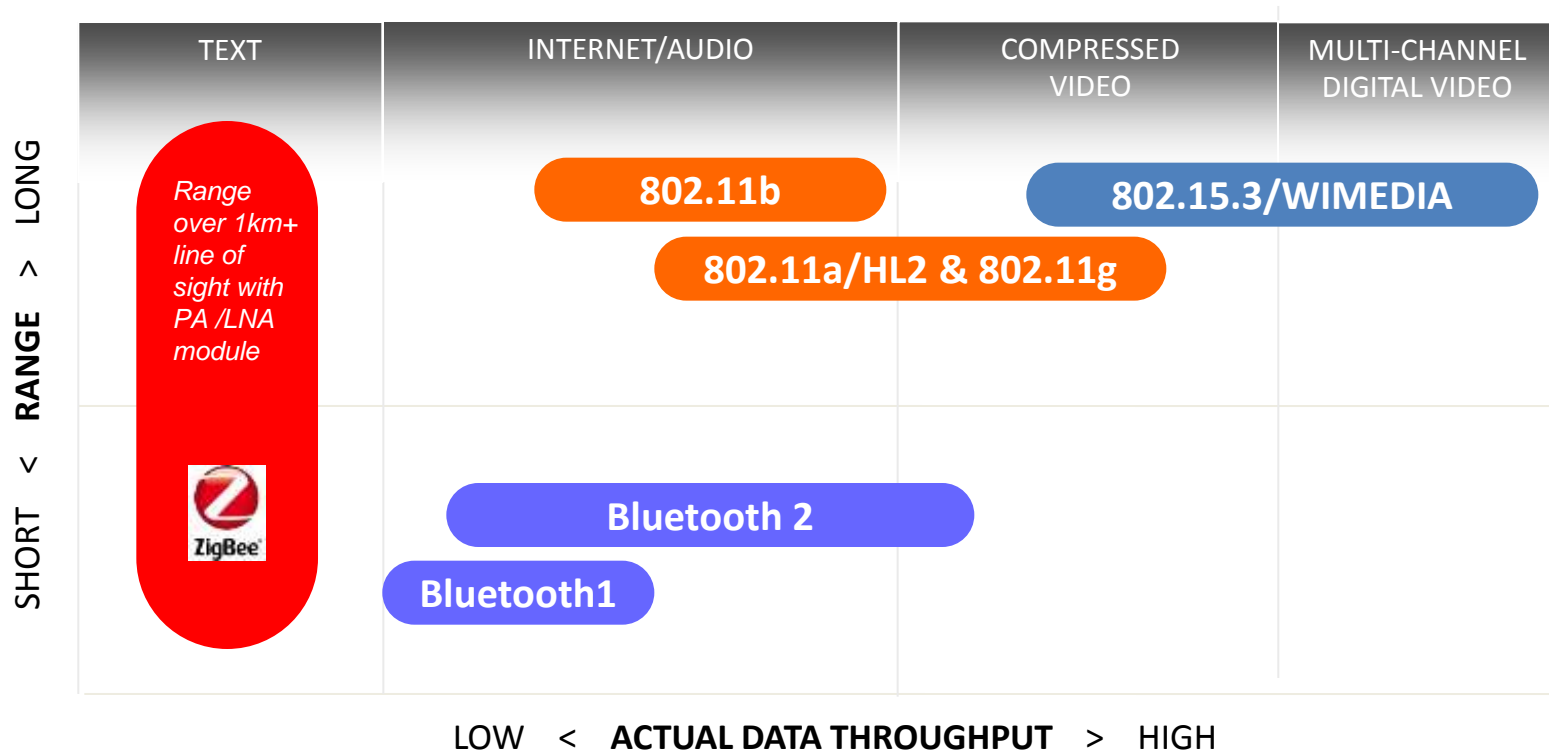
What range can you achieve with 2.4GHz ZigBee?

Line-of-sight ZigBee can easily achieve over 1Km using a power amplified module.

However, this is not a common scenario and in most indoor applications a range of around 30 meters can be expected – depending upon building construction, possible RF interferers and so on.



Wireless Network Technology



ZigBee is self healing, mesh-networking radio currently operating at 2.4GHz – sub Gig to follow in late 2013

How does ZigBee work?

How is a basic ZigBee PRO network established?

The next few slides show simply how a ZigBee network is set up and how it self heals when a participating node is lost to the system.

First the co-ordinator node scans the 16 channels available to ZigBee at 2.4GHz - finds the channel with the least RF noise and establishes a unique Personal Area Network (PAN) on that channel.

Then – as new nodes are powered up – they search the same 16 channels and, on discovering the PAN, they effect joining.

Optimisation of the resulting ZigBee network is continuous and fluid with the participating nodes constantly seeking the best routes for sending data throughout the network.



One Co-ordinator per network – Mains Powered



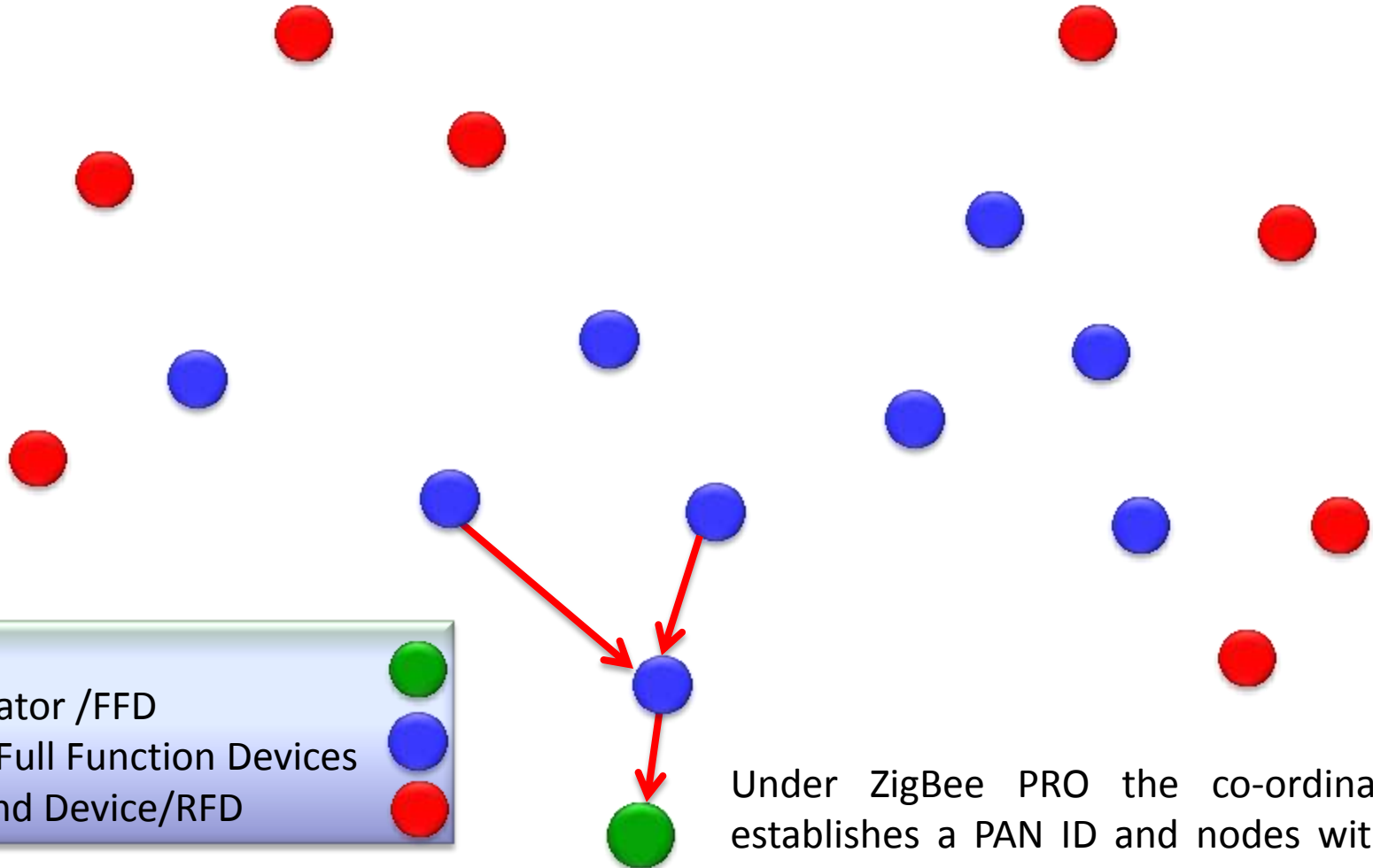
Router device – Mains Powered



Sleepy end device – battery powered



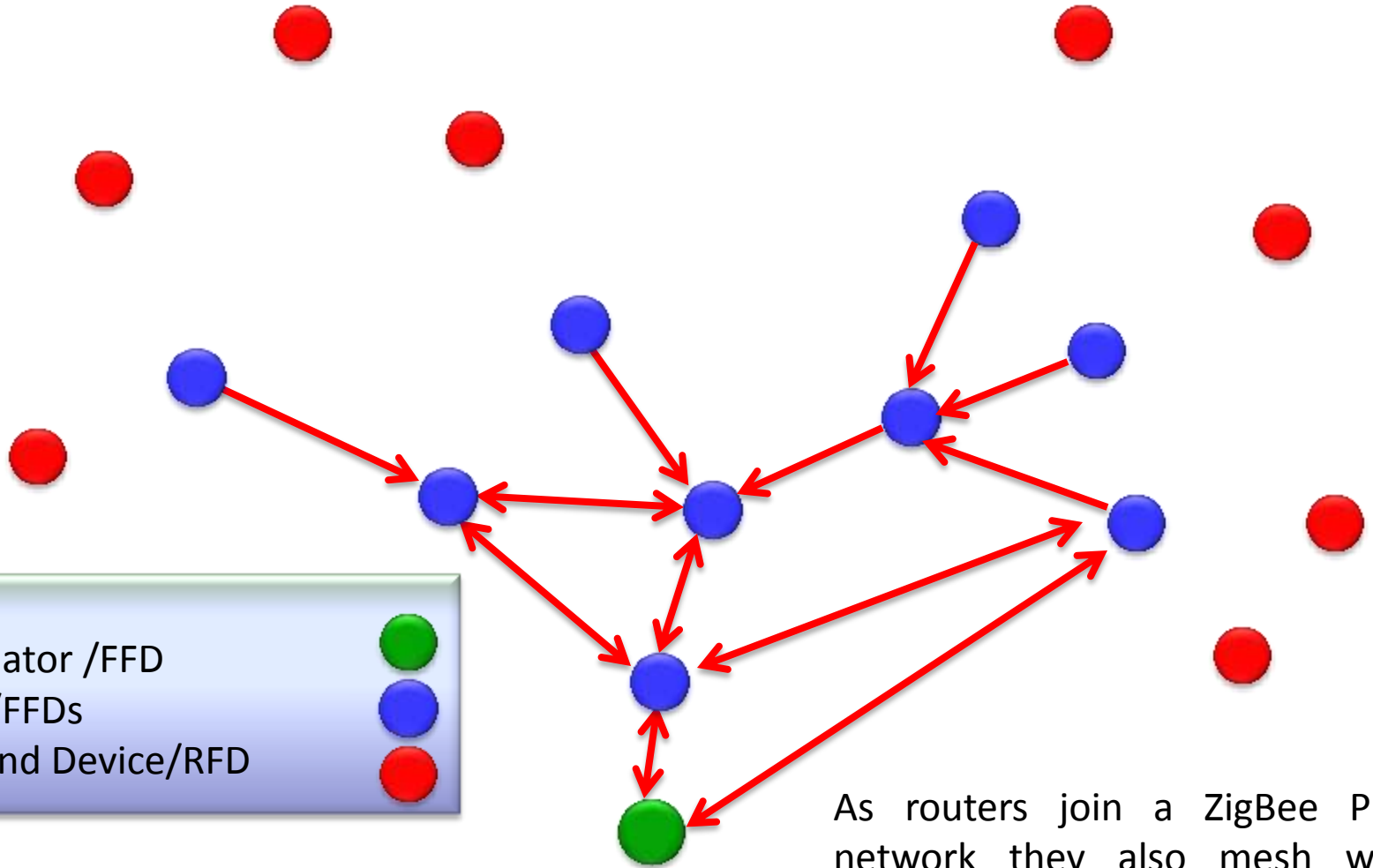
ZigBee PRO Network 1



Co-ordinator / FFD	
Routers / Full Function Devices	
Sleepy End Device / RFD	

Under ZigBee PRO the co-ordinator establishes a PAN ID and nodes within range effect joining

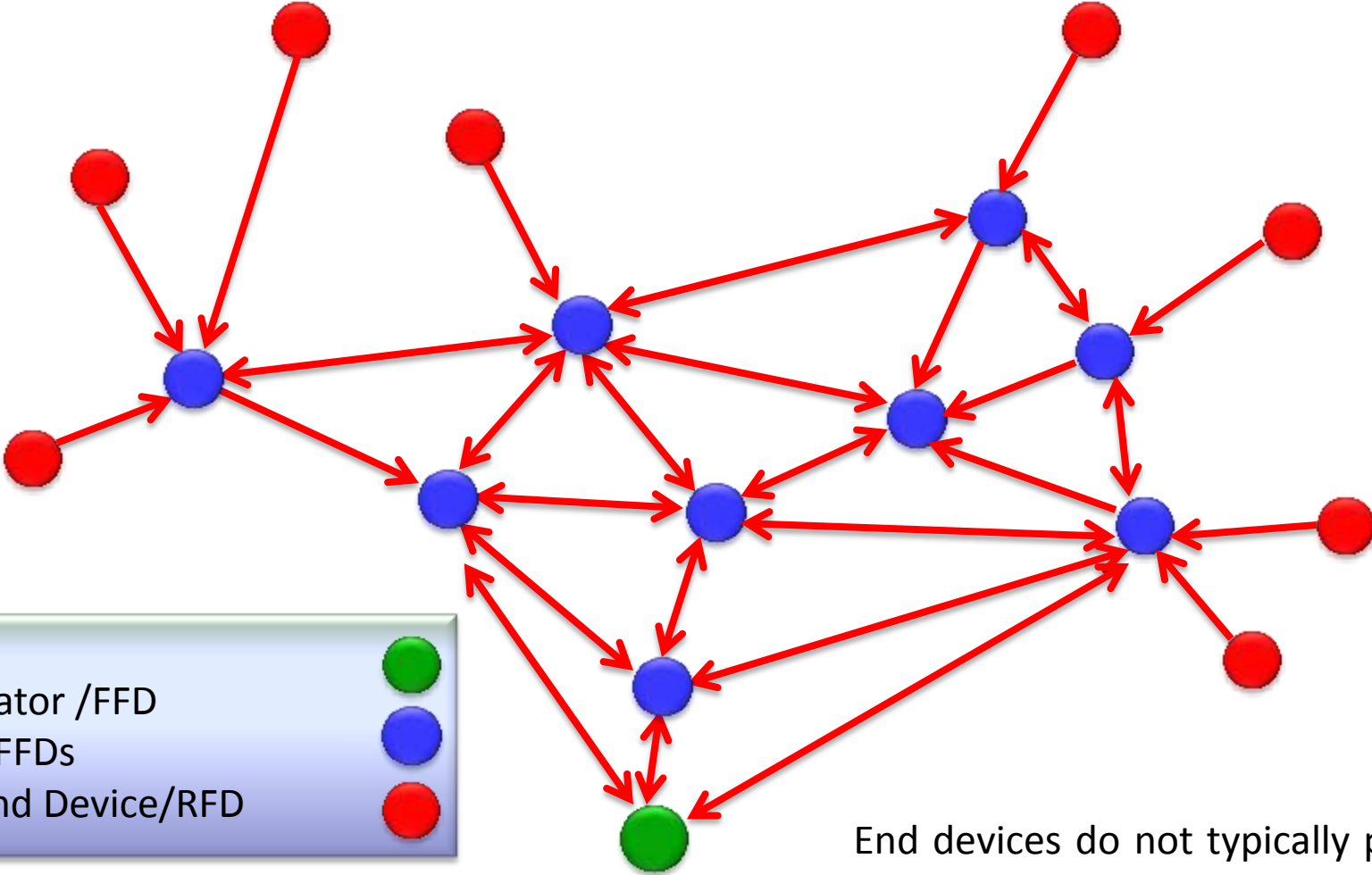
ZigBee PRO Network 2



Co-ordinator /FFD	
Routers/FFDs	
Sleepy End Device/RFD	

As routers join a ZigBee PRO network they also mesh with each other

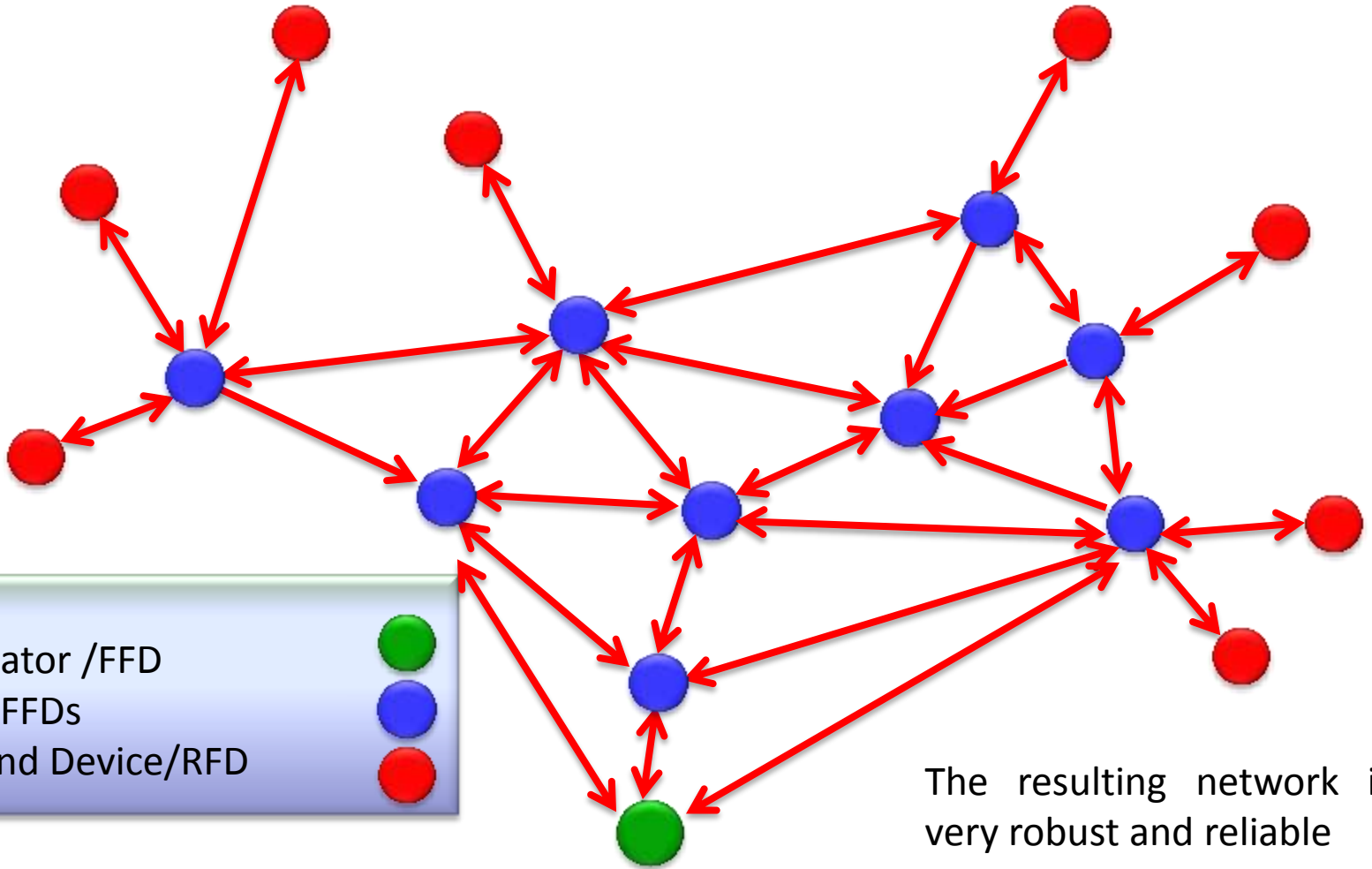
ZigBee PRO Network 3



Co-ordinator / FFD	
Routers / FFDs	
Sleepy End Device / RFD	

End devices do not typically play an active role in networks being asleep most of the time to conserve battery life

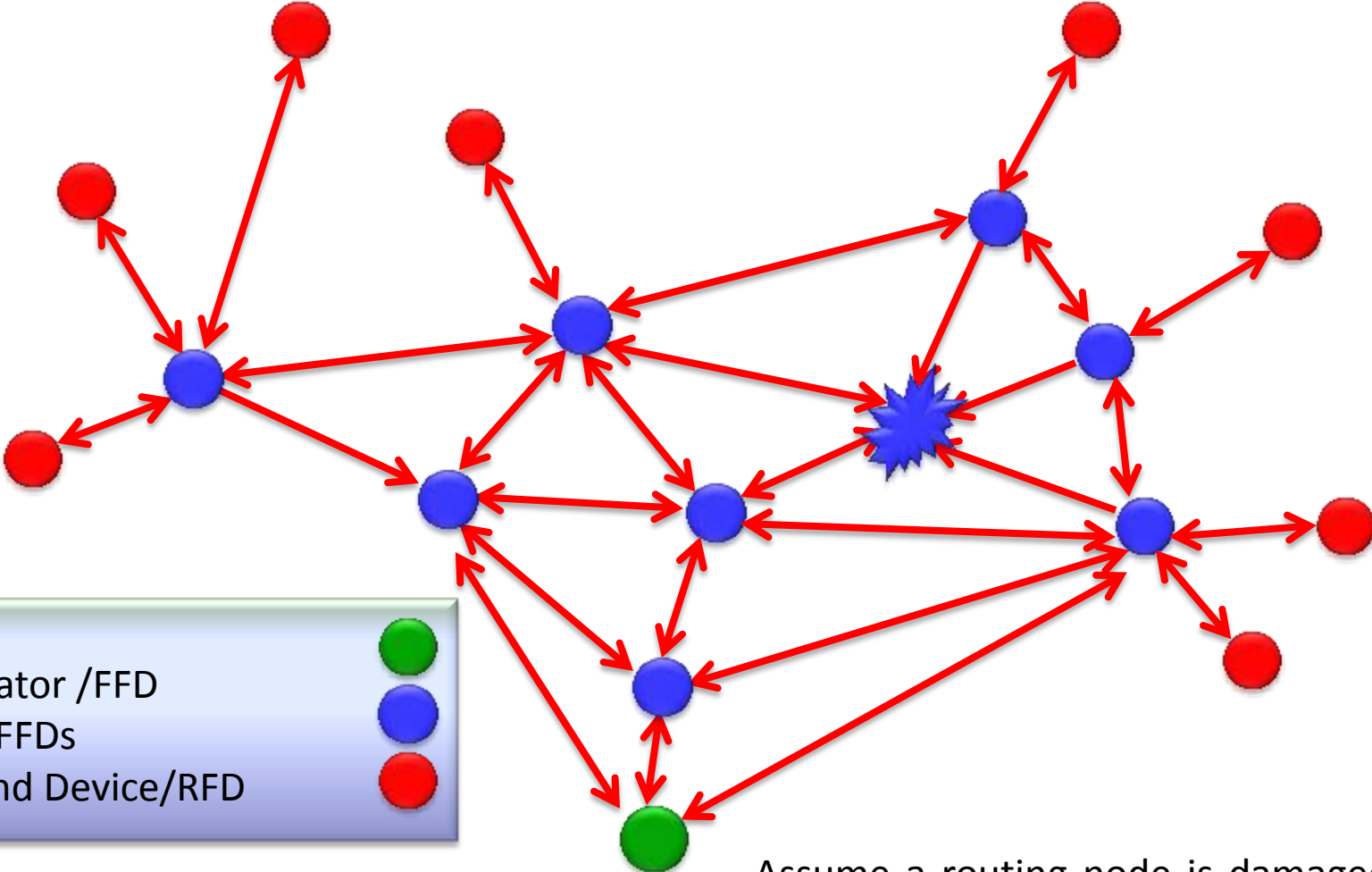
ZigBee PRO Network 4



Co-ordinator / FFD
Routers / FFDs
Sleepy End Device / RFD

The resulting network is very robust and reliable

ZigBee PRO Network 5



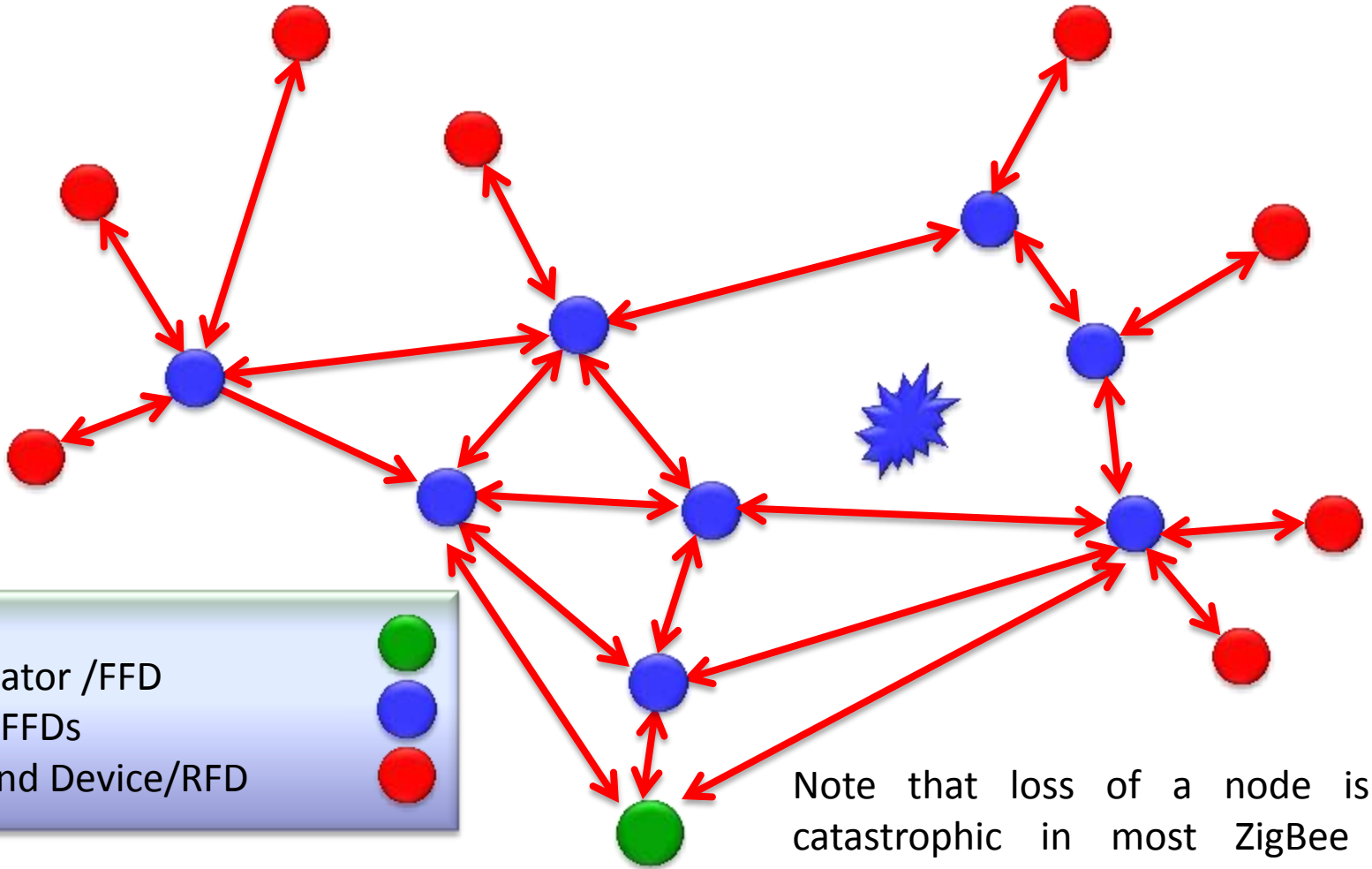
Co-ordinator /FFD 

Routers/FFDs 

Sleepy End Device/RFD 

Assume a routing node is damaged or lost from the network

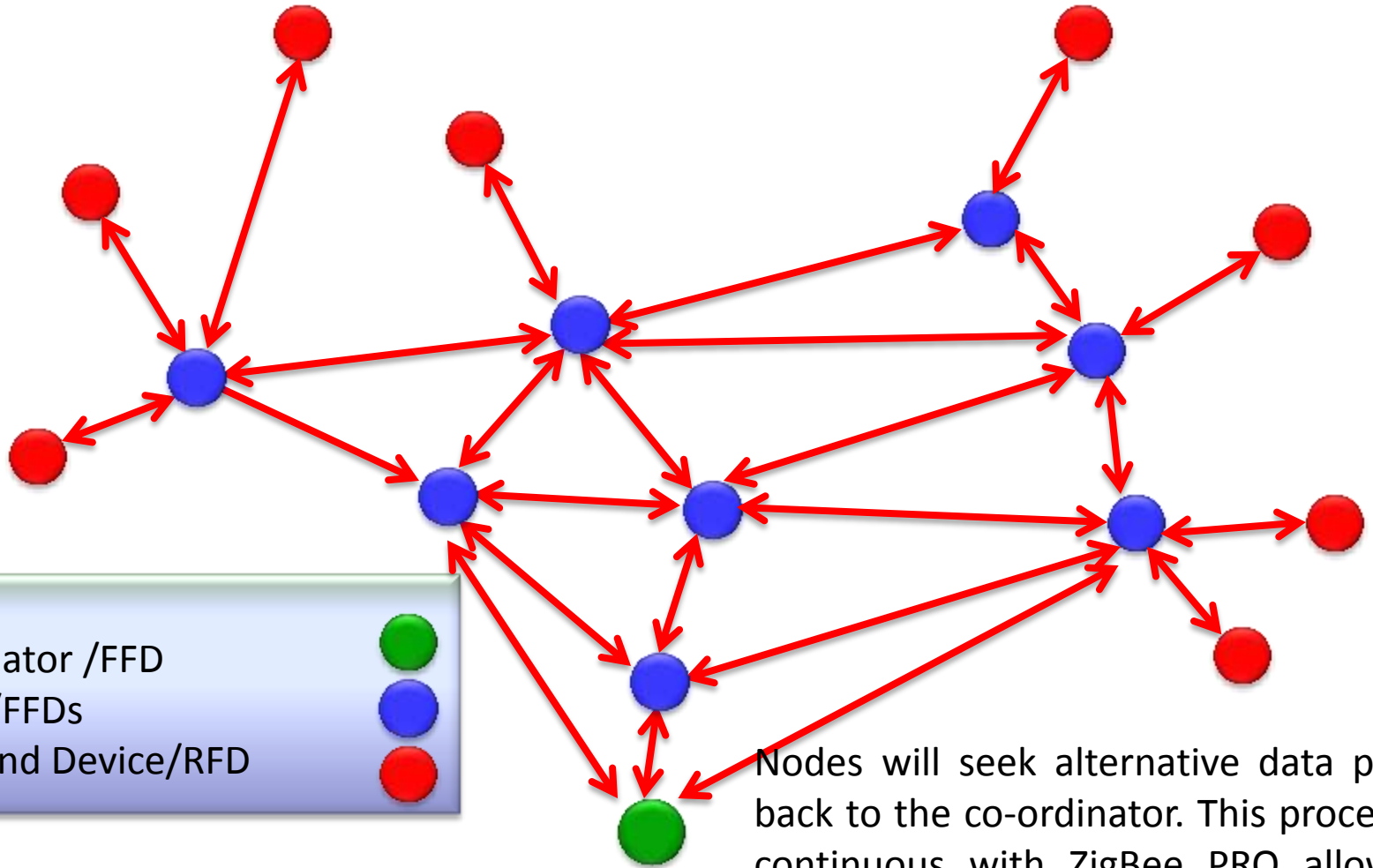
ZigBee PRO Network 6



Co-ordinator /FFD 
Routers/FFDs 
Sleepy End Device/RFD 

Note that loss of a node is not catastrophic in most ZigBee PRO networks and may not adversely affect the network at all

ZigBee PRO Network 7

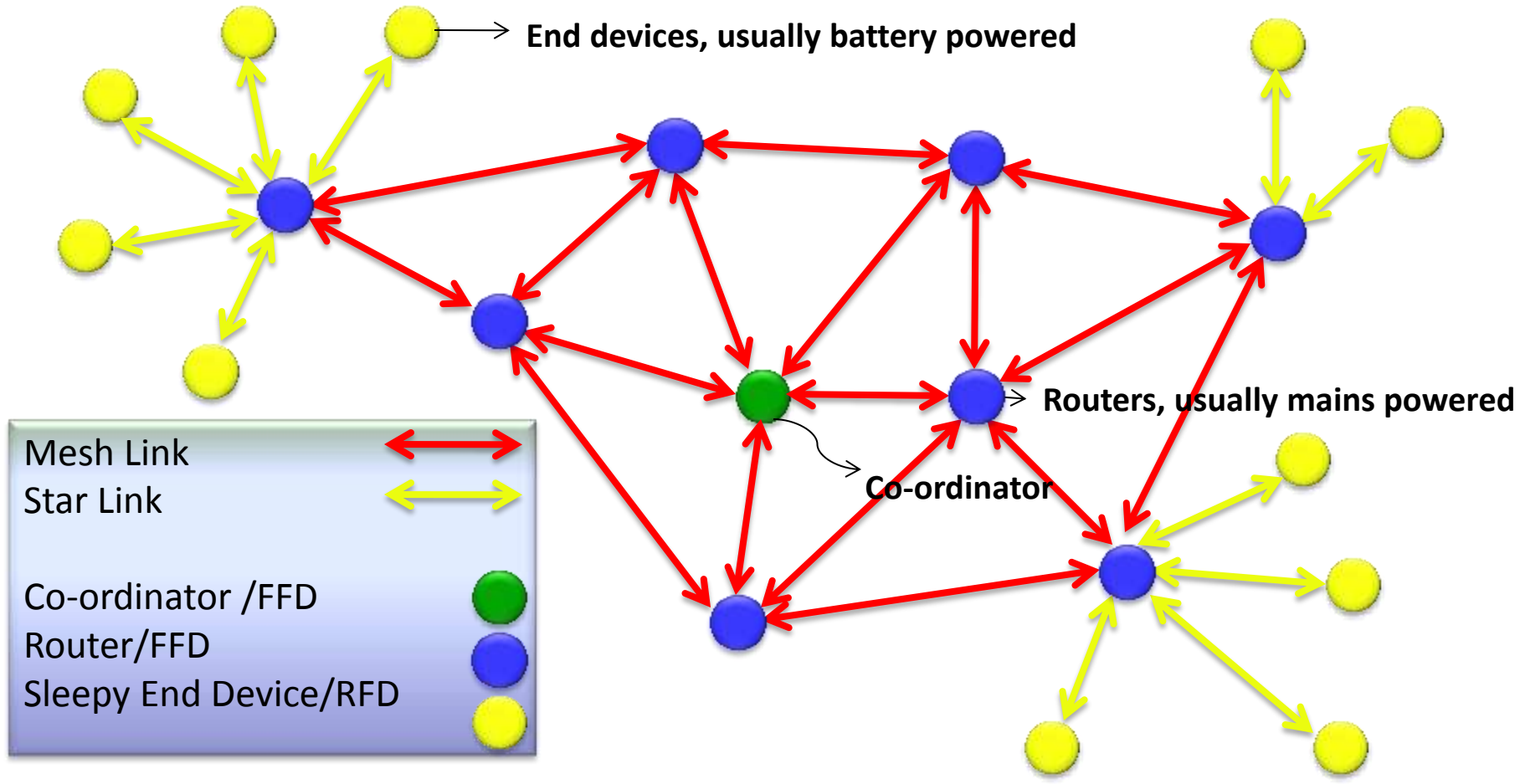


Co-ordinator / FFD
Routers / FFDs
Sleepy End Device / RFD



Nodes will seek alternative data paths back to the co-ordinator. This process is continuous with ZigBee PRO allowing for a changing radio environment within a network

Typical ZigBee PRO set-up

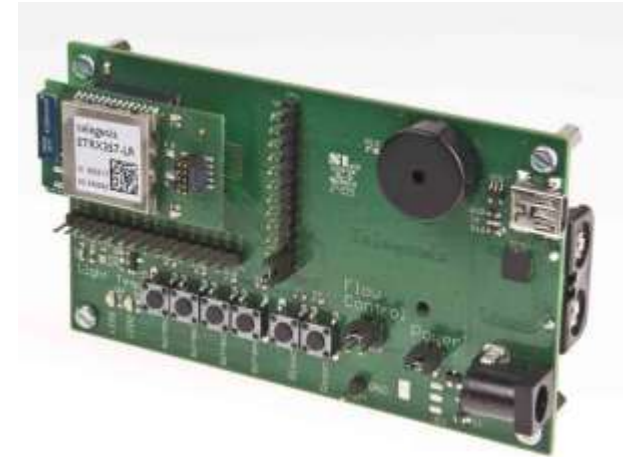


Mixed Star and Mesh topologies

Telegesis ZigBee Evaluation Kit

Telegesis Evaluation Kit Features

- Set up a ZigBee mesh network in minutes
- Low cost evaluation platform
- Broad selection of modules included
- Simple world leading AT command interface to implement ZigBee applications



SRP: \$349/€255/£235



ZigBee – Levels & Layers

Application Level

Manufacturer
Specific Profile
(MSP)



Developer implements ZigBee applications based on MSP or Public Profiles

ZigBee Stack level

Mesh Network Layer – ZigBee PRO

No developer access needed at this level

Physical/Data Link Level

IEEE 802.15.4 MAC Layer

IEEE 802.15.4 PHY Layer

MAC = Media Access Controller, PHY = Physical

ZigBee Public Profiles

- ZigBee public profiles already exist for companies wishing to make solutions based on a worldwide standards based solution in the following fields:



ZigBee Light Link



ZigBee Health Care



ZigBee Building Automation



ZigBee Retail Services



ZigBee Home Automation



ZigBee Remote Control



ZigBee Telecom Services



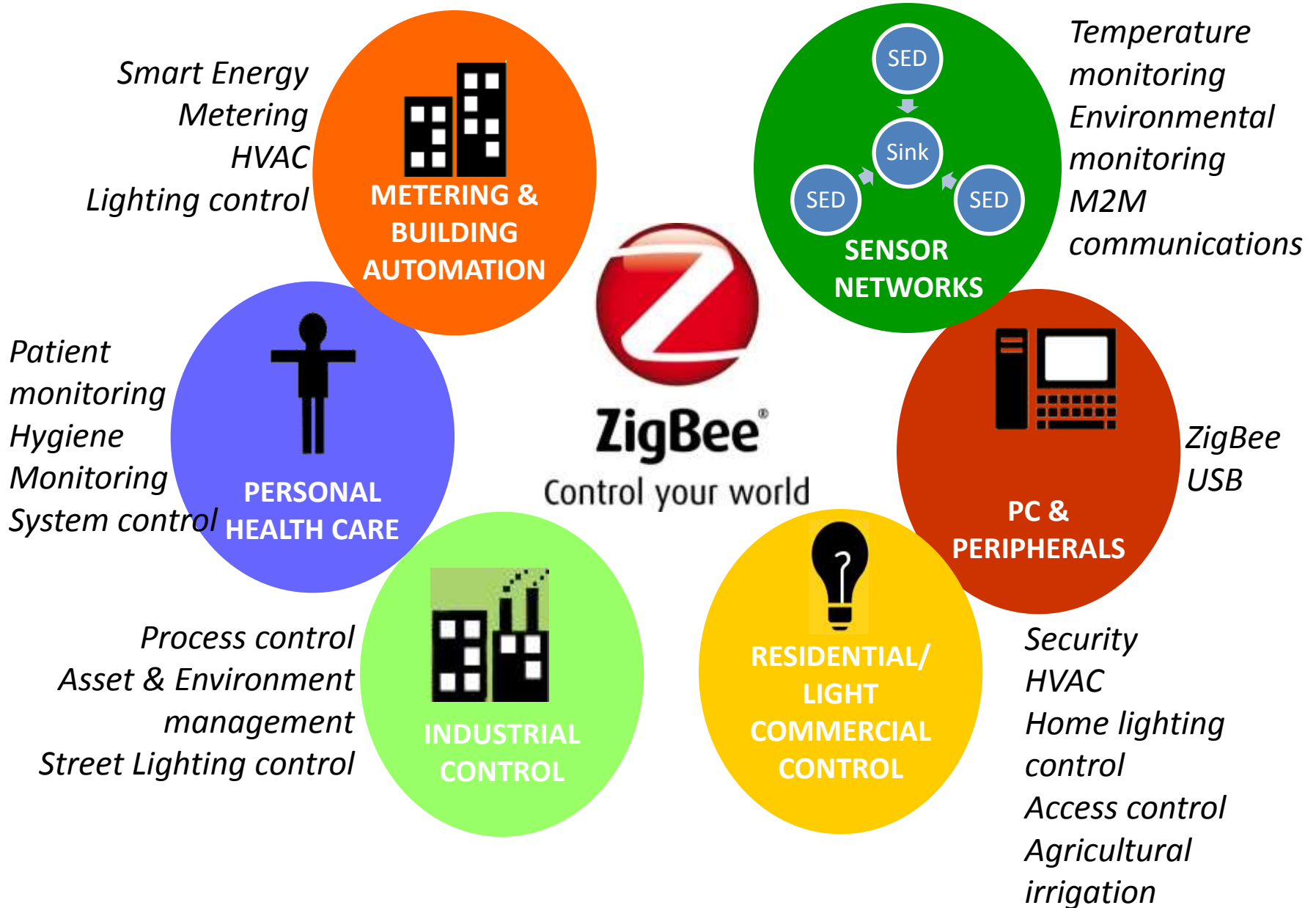
ZigBee Input Device



ZigBee Smart Energy

More public profiles are being added – watch this space.....

ZigBee Markets



Strategic Verticals

- Metering

- Electric
- Gas
- Water
- IHD



- Solar

- Micro Invertors
- Gateways



- Lighting

- Interior
- Exterior



- HVAC

- Thermostats
- Rad Valves
- Building Controls
- Sensors



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