sigfox

Protocols for the connected objects

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1.

Introduction

1. Introduction

2009

Beginning of a create story

16,418,500€

Turnover made in 2015

5 million km²

The total superficy covered by Sigfox network

1. Introduction

Low energy consumption

Low Cost

Complementary technology

IoT SERVICES PROVIDER

1. Introduction

ARCHITECTURE OVERVIEW

Sigfox network architecture

2.

Physical layer

2.1

Frequency

2. Physical layer

868 - 869 MHz

In Europe

902 - 928 MHz

In the rest of the world

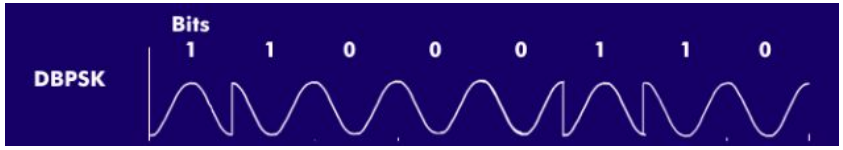
2.2

Bandwidth and modulation

2. Physical layer

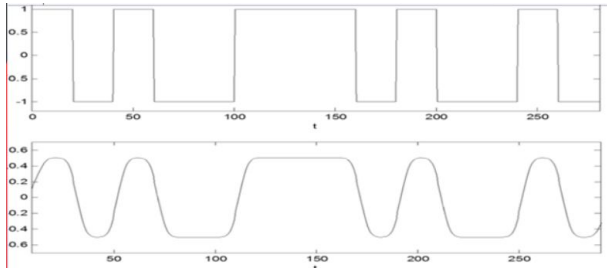
Uplink messages

DBPSK modulation



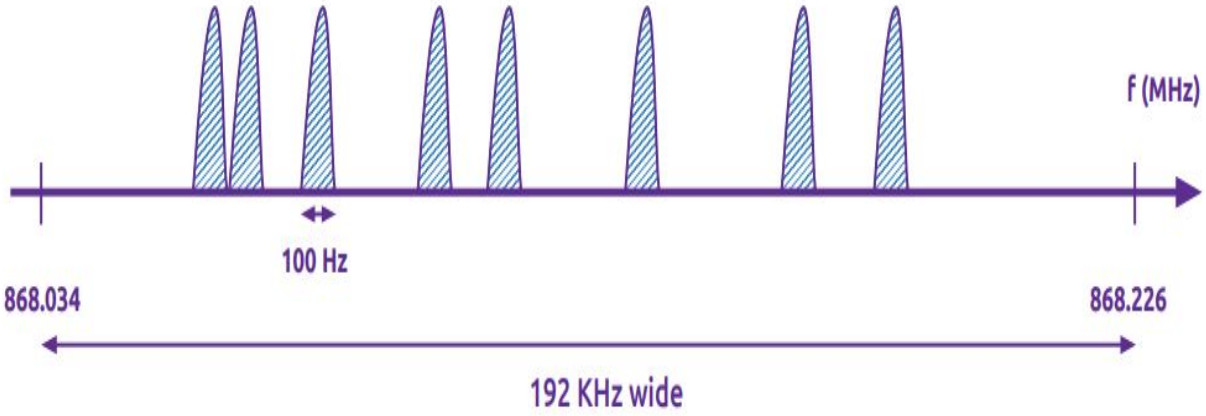
Downlink messages

GFSK modulation



SIGFOX

BANDWIDTH

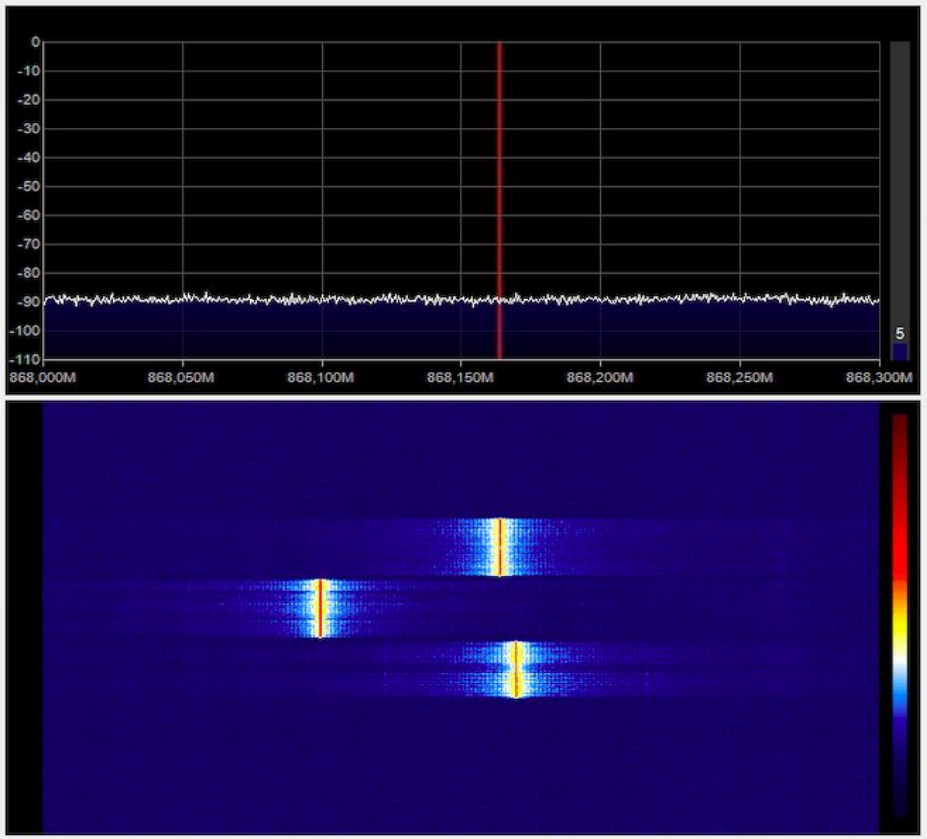


2.3

Time/Frequency hopping

2. Physical layer

Each message sent **3 times** on **3 different frequencies** and **delayed in time**.



SIGFOX

Time/Frequency hopping

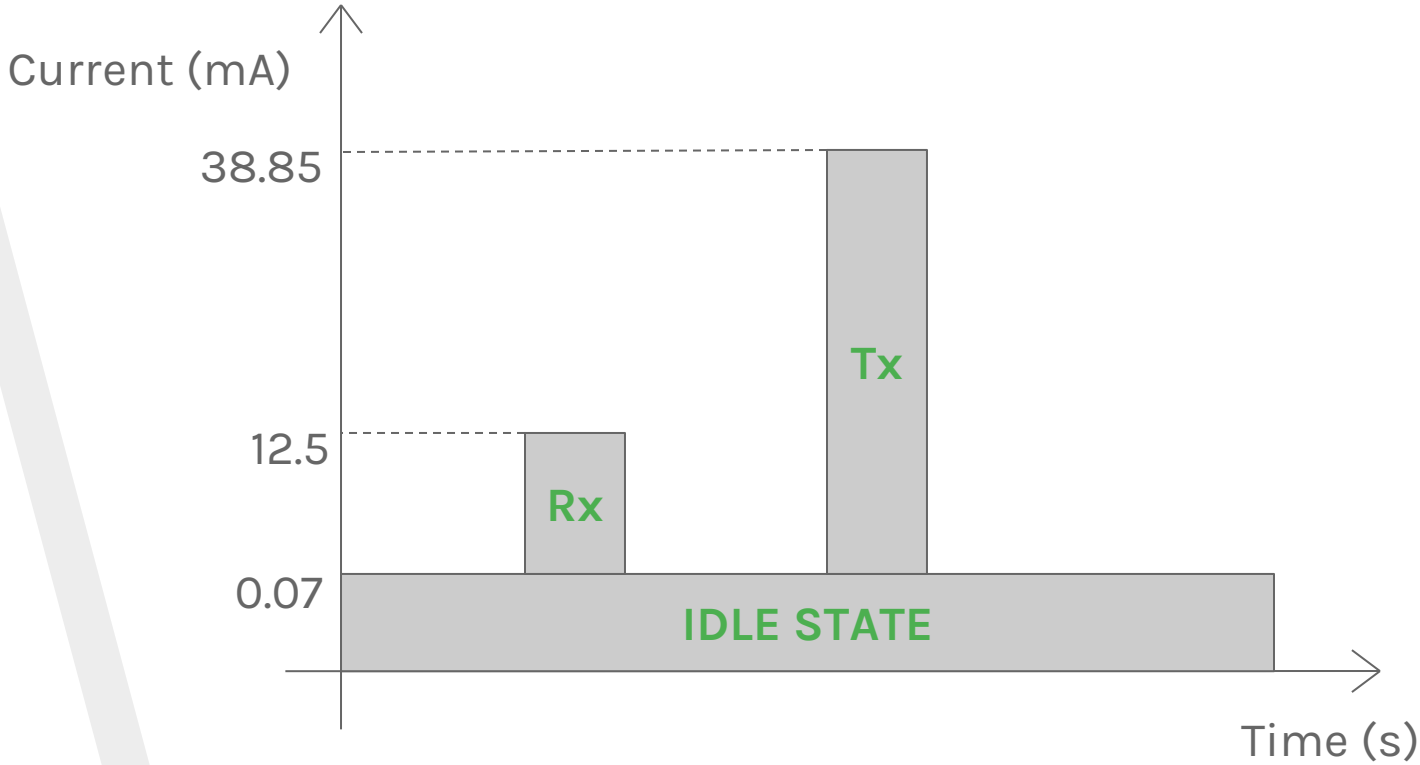
3.

Power consumption

3.1

Devices consumption

3. Power Consumption



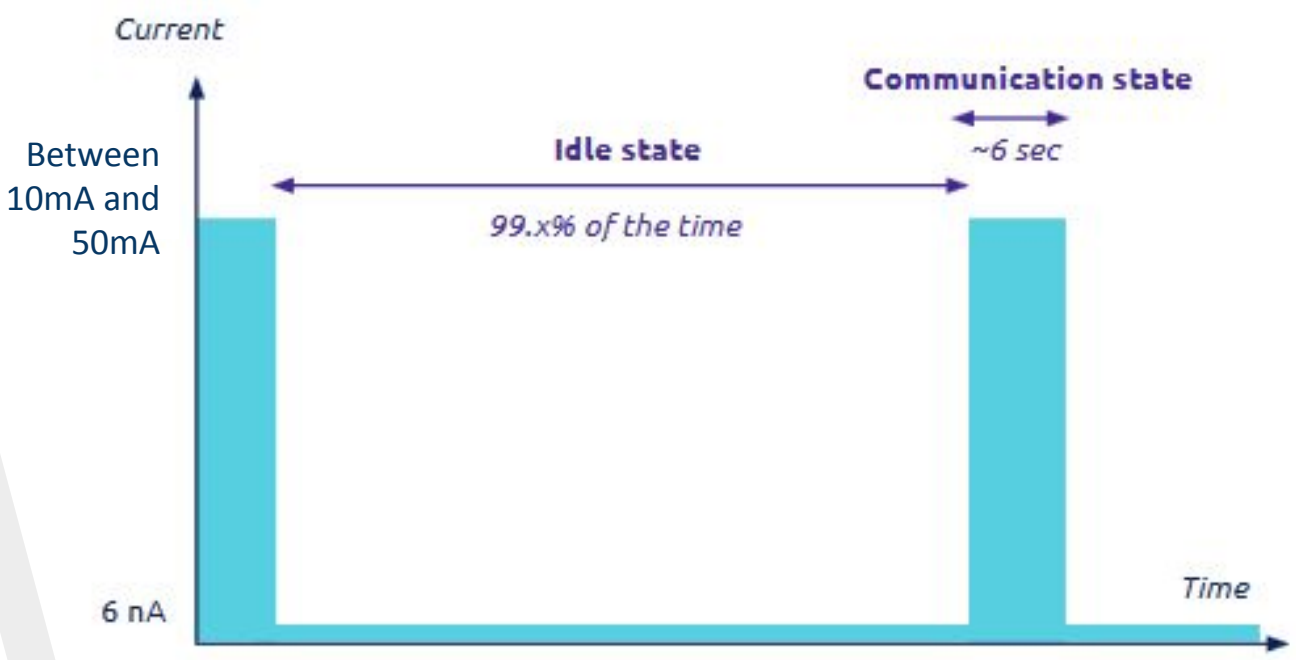
DEVICES
CONSUMPTION

3. Power Consumption

Idle State	Reception	Transmission
231 µW	41.25 mW	128.5 mW

DEVICES
CONSUMPTION

3. Power Consumption



DEVICES
CONSUMPTION

3. Power Consumption

Min Power	Max Power	Max Idle State Power
33 mW	165 mW	19.8 mW

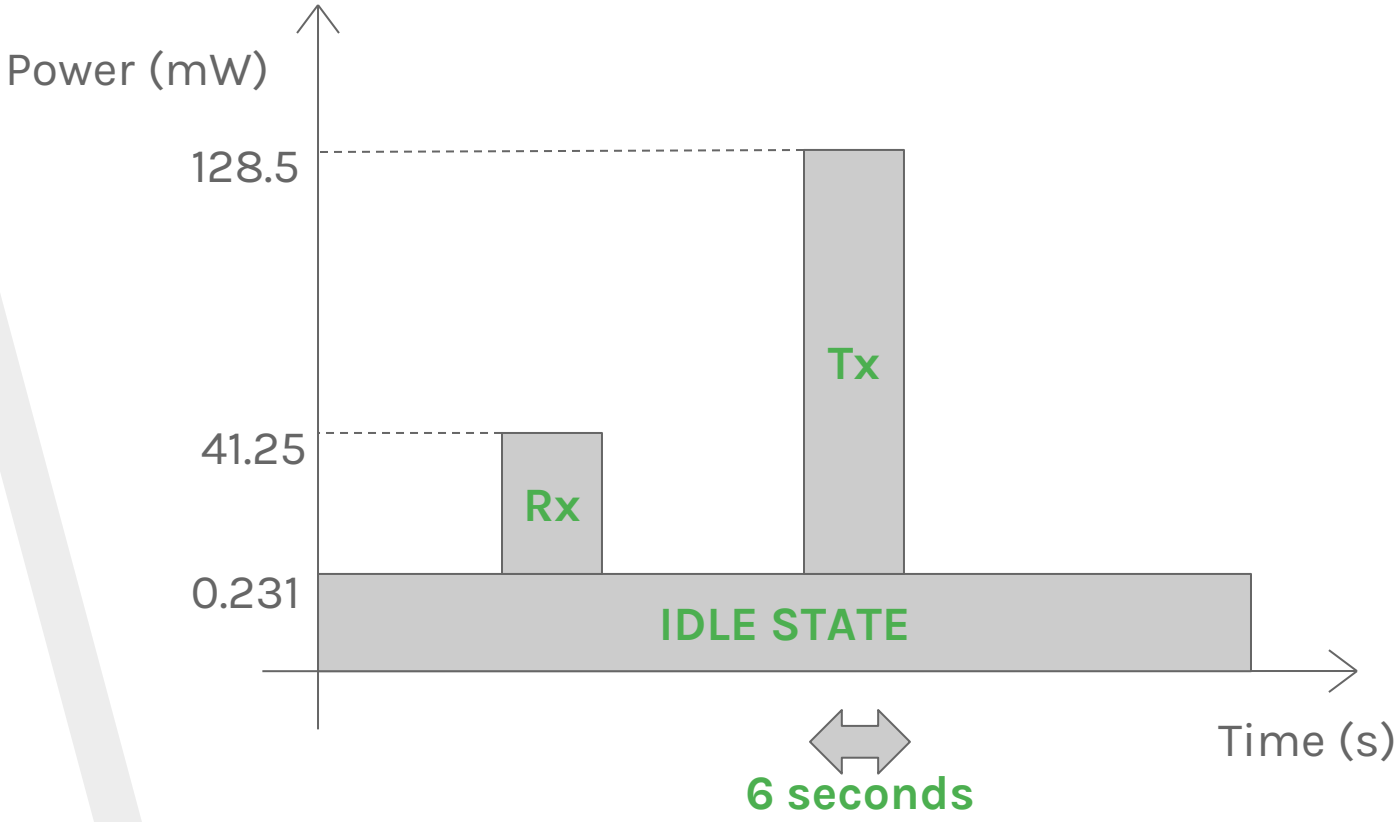
Considering a device supplied with 3.3 V

DEVICES
CONSUMPTION

3.2

Energy per bit

3. Power Consumption



ENERGY PER BIT

12 bytes or 96 bits ⇨ E = 8 mJ/bit

3. Power Consumption

6 Seconds

26 Bytes DF

33mW

E_{min} = 198 mJ

E_{min}/bit = 0.95 mJ/bit

6 Seconds

14 Bytes DF

165mW

E_{max} = 990 mJ

E_{max}/bit = 8.84 mJ/bit

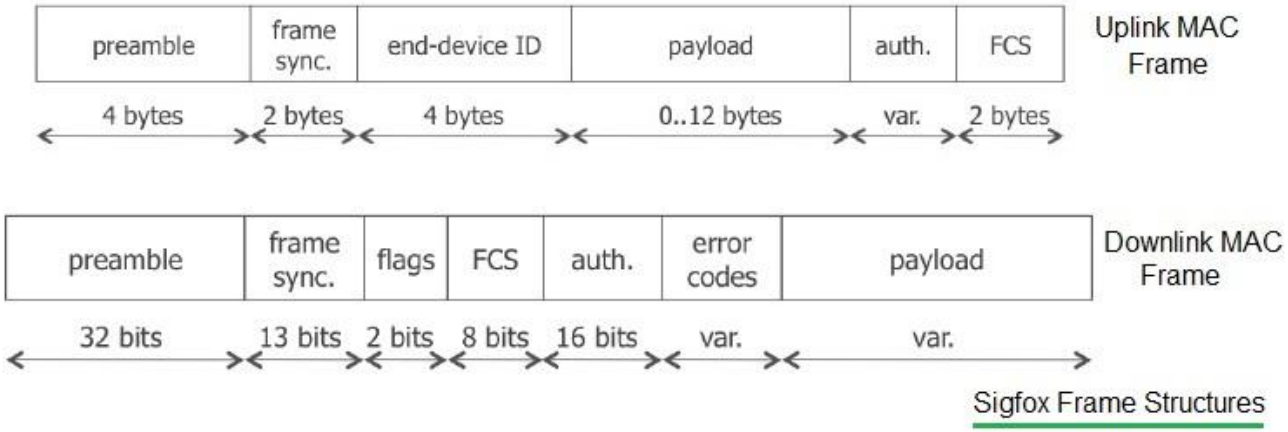
ENERGY PER BIT

4.

MAC layer

4. MAC layer

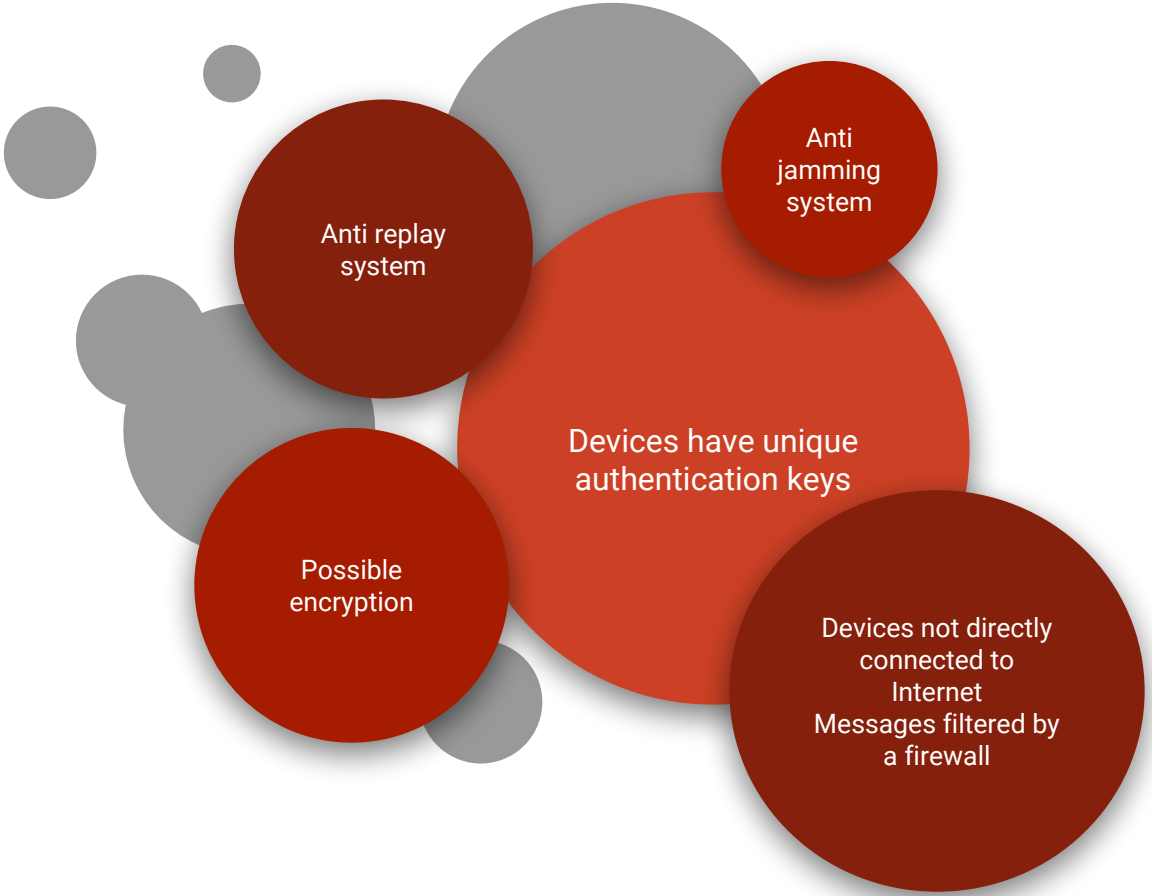
- **RFTDMA** (Random Frequency and Time Division Multiple Access)
- MAX **140 messages sent, 4 received** per day



5.

Security

5. Security



SECURITY FEATURES

6.

Routing and IP

6. Routing and IP

Star topology

Point-to-point link

Messages pushed to customer services

7.

Mobility

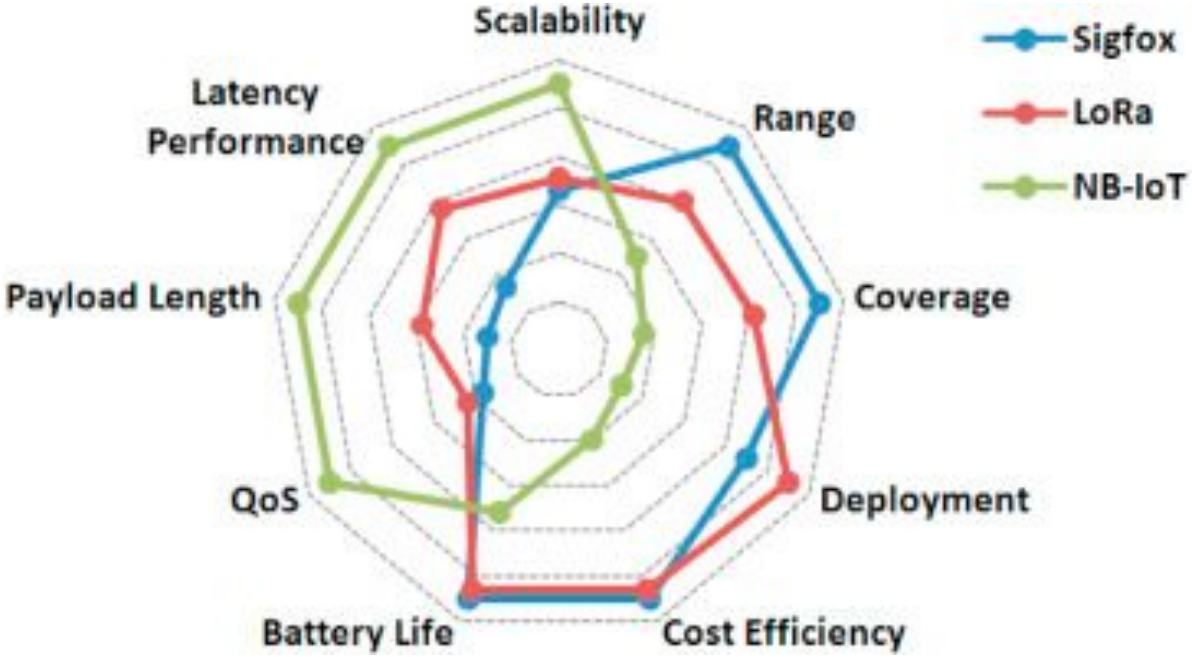
7. Mobility

- Unreliable communication at pedestrian speed
- **Not adapted**

8.

Conclusion

8. Conclusion



Conclusion

Thank you!

Any questions?