docker-compose.yml

```
version: "3"

services:
  chirpstack:
    image: chirpstack/chirpstack:4
    command: -c /etc/chirpstack
    restart: unless-stopped
    volumes:
      - ./configuration/chirpstack:/etc/chirpstack
      - ./lorawan-devices:/opt/lorawan-devices
    depends_on:
      - postgres
      - mosquitto
      - redis
    environment:
      - MQTT_BROKER_HOST=mosquitto
      - REDIS_HOST=redis
      - POSTGRESQL_HOST=postgres
    ports:
      - 8080:8080

  chirpstack-gateway-bridge:
    image: chirpstack/chirpstack-gateway-bridge:4
    restart: unless-stopped
    ports:
      - 1700:1700/udp
    volumes:
      - ./configuration/chirpstack-gateway-bridge:/etc/chirpstack-gateway-bridge
    environment:
      - INTEGRATION__MQTT__EVENT_TOPIC_TEMPLATE=as923_1ch/gateway/{{ .GatewayID
}}/event/{{ .EventType }}
      - INTEGRATION__MQTT__STATE_TOPIC_TEMPLATE=as923_1ch/gateway/{{ .GatewayID
}}/state/{{ .StateType }}
      - INTEGRATION__MQTT__COMMAND_TOPIC_TEMPLATE=as923_1ch/gateway/{{ .GatewayID }}/command/#
    depends_on:
      - mosquitto

  chirpstack-gateway-bridge-basicstation:
    image: chirpstack/chirpstack-gateway-bridge:4
    restart: unless-stopped
    command: -c /etc/chirpstack-gateway-bridge/chirpstack-gateway-bridge-basicstation-as923_1ch.toml
    ports:
      - 3001:3001
    volumes:
      - ./configuration/chirpstack-gateway-bridge:/etc/chirpstack-gateway-bridge
    depends_on:
      - mosquitto

  chirpstack-rest-api:
    image: chirpstack/chirpstack-rest-api:4
    restart: unless-stopped
    command: --server chirpstack:8080 --bind 0.0.0.0:8090 --insecure
    ports:
      - 8090:8090
    depends_on:
      - chirpstack

  postgres:
    image: postgres:14-alpine
    restart: unless-stopped
    volumes:
      - ./configuration/postgresql/initdb:/docker-entrypoint-initdb.d
      - postgresqldata:/var/lib/postgresql/data
    environment:
      - POSTGRES_PASSWORD=root

  redis:
    image: redis:7-alpine
    restart: unless-stopped
    command: redis-server --save 300 1 --save 60 100 --appendonly no
    volumes:
      - redisdata:/data
```

```
  mosquitto:
    image: eclipse-mosquitto:2
    restart: unless-stopped
    ports:
      - 1883:1883
    volumes:
      - ./configuration/mosquitto/config/:/mosquitto/config/

volumes:
  postgresqldata:
  redisdata:
```

configuration/chirpstack/chirpstack.toml

```
# Logging.
[logging]

  # Log level.
  #
  # Options are: trace, debug, info, warn error.
  level="info"


# PostgreSQL configuration.
[postgresql]

  # PostgreSQL DSN.
  #
  # Format example: postgres://<USERNAME>:<PASSWORD>@<HOSTNAME>/<DATABASE>?sslmode=<SSLMODE>.
  #
  # SSL mode options:
  #  * disable - no SSL
  #  * require - Always SSL (skip verification)
  #  * verify-ca - Always SSL (verify that the certificate presented by the server was signed by a
trusted CA)
  #  * verify-full - Always SSL (verify that the certification presented by the server was signed by
a trusted CA and the server host name matches the one in the certificate)
  dsn="postgres://chirpstack:chirpstack@$POSTGRESQL_HOST/chirpstack?sslmode=disable"

  # Max open connections.
  #
  # This sets the max. number of open connections that are allowed in the
  # PostgreSQL connection pool.
  max_open_connections=10

  # Min idle connections.
  #
  # This sets the min. number of idle connections in the PostgreSQL connection
  # pool (0 = equal to max_open_connections).
  min_idle_connections=0


# Redis configuration.
[redis]

  # Server address or addresses.
  #
  # Set multiple addresses when connecting to a cluster.
  servers=[
    "redis://$REDIS_HOST/",
  ]

  # TLS enabled.
  tls_enabled=false

  # Redis Cluster.
  #
  # Set this to true when the provided URLs are pointing to a Redis Cluster
  # instance.
  cluster=false


# Network related configuration.
[network]

  # Network identifier (NetID, 3 bytes) encoded as HEX (e.g. 010203).
  net_id="000000"

  # Enabled regions.
  #
  # Multiple regions can be enabled simultaneously. Each region must match
  # the 'name' parameter of the region configuration in '[[regions]]'.
  enabled_regions=[
    "as923",
    "as923_2",
    "as923_3",
    "as923_4",
```

```
    "as923_1ch",
    "au915_0",
    "cn470_10",
    "cn779",
    "eu433",
    "eu868",
    "in865",
    "ism2400",
    "kr920",
    "ru864",
    "us915_0",
    "us915_1",
  ]


# API interface configuration.
[api]

  # interface:port to bind the API interface to.
  bind="0.0.0.0:8080"

  # Secret.
  #
  # This secret is used for generating login and API tokens, make sure this
  # is never exposed. Changing this secret will invalidate all login and API
  # tokens. The following command can be used to generate a random secret:
  #   openssl rand -base64 32
  secret="you-must-replace-this"


[integration]
  enabled=["mqtt"]

  [integration.mqtt]
    server="tcp://$MQTT_BROKER_HOST:1883/"
    json=true
```

configuration/chirpstack/region_as923_1ch.toml

```
# This file contains an example AS923 configuration.
[[regions]]

  # ID is an user-defined identifier for this region.
  id="as923_1ch"

  # Description is a short description for this region.
  description="AS923_1ch"

  # Common-name refers to the common-name of this region as defined by
  # the LoRa Alliance.
  common_name="AS923"


  # Gateway configuration.
  [regions.gateway]

    # Force gateways as private.
    #
    # If enabled, gateways can only be used by devices under the same tenant.
    force_gws_private=false


    # Gateway backend configuration.
    [regions.gateway.backend]

      # The enabled backend type.
      enabled="mqtt"

      # MQTT configuration.
      [regions.gateway.backend.mqtt]

        # Topic prefix.
        #
        # The topic prefix can be used to define the region of the gateway.
        # Note, there is no need to add a trailing '/' to the prefix. The trailing
        # '/' is automatically added to the prefix if it is configured.
        topic_prefix="as923_1ch"

        # MQTT server (e.g. scheme://host:port where scheme is tcp, ssl or ws)
        server="tcp://$MQTT_BROKER_HOST:1883"

        # Connect with the given username (optional)
        username=""

        # Connect with the given password (optional)
        password=""

        # Quality of service level
        #
        # 0: at most once
        # 1: at least once
        # 2: exactly once
        #
        # Note: an increase of this value will decrease the performance.
        # For more information: https://www.hivemq.com/blog/mqtt-essentials-part-6-mqtt-quality-of-
service-levels
        qos=0

        # Clean session
        #
        # Set the "clean session" flag in the connect message when this client
        # connects to an MQTT broker. By setting this flag you are indicating
        # that no messages saved by the broker for this client should be delivered.
        clean_session=false

        # Client ID
        #
        # Set the client id to be used by this client when connecting to the MQTT
        # broker. A client id must be no longer than 23 characters. If left blank,
        # a random id will be generated by ChirpStack.
        client_id=""
```

```
      # Keep alive interval.
      #
      # This defines the maximum time that that should pass without communication
      # between the client and server.
      keep_alive_interval="30s"

      # CA certificate file (optional)
      #
      # Use this when setting up a secure connection (when server uses ssl://...)
      # but the certificate used by the server is not trusted by any CA certificate
      # on the server (e.g. when self generated).
      ca_cert=""

      # TLS certificate file (optional)
      tls_cert=""

      # TLS key file (optional)
      tls_key=""


  # Gateway channel configuration.
  #
  # Note: this configuration is only used in case the gateway is using the
  # ChirpStack Concentratord daemon. In any other case, this configuration
  # is ignored.
  [[regions.gateway.channels]]
    frequency=923200000
    bandwidth=125000
    modulation="LORA"
    spreading_factors=[10]

  [[regions.gateway.channels]]
    frequency=923400000
    bandwidth=125000
    modulation="LORA"
    spreading_factors=[10]


# Region specific network configuration.
[regions.network]

  # Installation margin (dB) used by the ADR engine.
  #
  # A higher number means that the network-server will keep more margin,
  # resulting in a lower data-rate but decreasing the chance that the
  # device gets disconnected because it is unable to reach one of the
  # surrounded gateways.
  installation_margin=10

  # RX window (Class-A).
  #
  # Set this to:
  # 0: RX1 / RX2
  # 1: RX1 only
  # 2: RX2 only
  rx_window=0

  # RX1 delay (1 - 15 seconds).
  rx1_delay=1

  # RX1 data-rate offset
  rx1_dr_offset=0

  # RX2 data-rate
  rx2_dr=2

  # RX2 frequency (Hz)
  rx2_frequency=923200000

  # Prefer RX2 on RX1 data-rate less than.
  #
  # Prefer RX2 over RX1 based on the RX1 data-rate. When the RX1 data-rate
  # is smaller than the configured value, then the Network Server will
  # first try to schedule the downlink for RX2, failing that (e.g. the gateway
  # has already a payload scheduled at the RX2 timing) it will try RX1.
  rx2_prefer_on_rx1_dr_lt=0

  # Prefer RX2 on link budget.
```

```
#
# When the link-budget is better for RX2 than for RX1, the Network Server will first
# try to schedule the downlink in RX2, failing that it will try RX1.
rx2_prefer_on_link_budget=false

# Downlink TX Power (dBm)
#
# When set to -1, the downlink TX Power from the configured band will
# be used.
#
# Please consult the LoRaWAN Regional Parameters and local regulations
# for valid and legal options. Note that the configured TX Power must be
# supported by your gateway(s).
downlink_tx_power=-1

# ADR is disabled.
adr_disabled=false

# Minimum data-rate.
min_dr=2

# Maximum data-rate.
max_dr=2

enabled_uplink_channels=[1]

# Rejoin-request configuration (LoRaWAN 1.1)
[regions.network.rejoin_request]

  # Request devices to periodically send rejoin-requests.
  enabled=false

  # The device must send a rejoin-request type 0 at least every 2^(max_count_n + 4)
  # uplink messages. Valid values are 0 to 15.
  max_count_n=0

  # The device must send a rejoin-request type 0 at least every 2^(max_time_n + 10)
  # seconds. Valid values are 0 to 15.
  #
  # 0  = roughly 17 minutes
  # 15 = about 1 year
  max_time_n=0


# Class-B configuration.
[regions.network.class_b]

  # Ping-slot data-rate.
  ping_slot_dr=3

  # Ping-slot frequency (Hz)
  #
  # set this to 0 to use the default frequency plan for the configured region
  # (which could be frequency hopping).
  ping_slot_frequency=0
```

configuration/chirpstack-gateway-bridge/chirpstack-gateway-bridge-basicstation-as923_1ch.toml

```
# See https://www.chirpstack.io/gateway-bridge/install/config/ for a full
# configuration example and documentation.

[integration.mqtt.auth.generic]
servers=["tcp://mosquitto:1883"]
username=""
password=""

[integration.mqtt]
event_topic_template="as923_1ch/gateway/{{ .GatewayID }}/event/{{ .EventType }}"
state_topic_template="as923_1ch/gateway/{{ .GatewayID }}/state/{{ .StateType }}"
command_topic_template="as923_1ch/gateway/{{ .GatewayID }}/command/#"

[backend]
type="basic_station"

  [backend.basic_station]
  bind=":3001"
  tls_cert=""
  tls_key=""
  ca_cert=""

  region="AS923"
  frequency_min=923200000
  frequency_max=923400000


  [[backend.basic_station.concentrators]]

    [backend.basic_station.concentrators.multi_sf]
    frequencies=[
      923200000,
      923400000,
    ]

    [backend.basic_station.concentrators.lora_std]
    frequency=924500000
    bandwidth=250000
    spreading_factor=7
```

LoRaHUB info

fw version: 0.3.3
radio type: SX1262
MAC address: 64:e8:33:5c:15:a8

LoRaWAN network server

address

192.168.1.13

port

1700

RX channel

frequency (MHz)

923.400000

spreading factor

10

bandwidth ◉ 125 ○ 250 ○ 500

Miscellaneous

SNTP server address

pool.ntp.org

configure

reboot

Tenants / ChirpStack / Gateways

Gateways

Add gateway | Selected gateways

	Last seen	Gateway ID	Name	Region ID	Region common-name
☐	● Online	2024-11-02 11:31:16	64e833fffe5c15a8	1ch	as923_1ch	AS923

< 1 > 10 / page

Tenants / ChirpStack / Device profiles / 1ch_A

1ch_A

device profile id: ded4bfd6-eaf5-493d-9bdb-1a7676b3014a

Delete device profile

General | Join (OTAA / ABP) | Class-B | Class-C | Codec | Relay | Tags | Measurements | Select device-profile template

* Name

1ch_A

Description

* Region

AS923

Region configuration

AS923_1ch

* MAC version

LoRaWAN 1.0.2

* Regional parameters revision

B

* ADR algorithm

Default ADR algorithm (LoRa only)

Flush queue on activate

Allow roaming