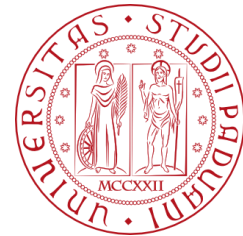


# MIDI Standard

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**Mobile Programming and Multimedia**  
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- MIDI: definition and representation
- Types of information
- Types of messages and structure
- Channel/system messages
- General MIDI mode
- Devices and connections (with example)
- Conclusions

# MIDI: what is it?



# MIDI

Source: [midi.org](http://midi.org)

- Communication protocol allowing electronic instruments to connect/exchange real-time data
- Represents musical scores using a specific scripting language
- Efficient compression, ideal for web and background music
- Coding not completely standard and requires specific equipment
- Mainly used for music composition and supports only western music



# Types of information



- **Channels**

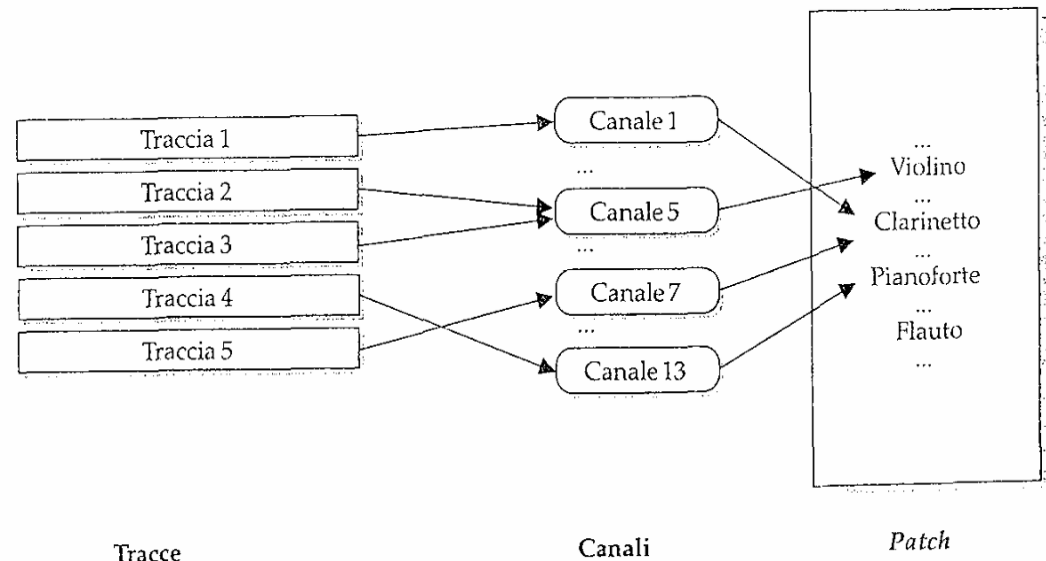
- *Means* through which send music events

- **Tracks**

- (Container of) *Sequences* of MIDI messages
- Each track is associated to one or more channels

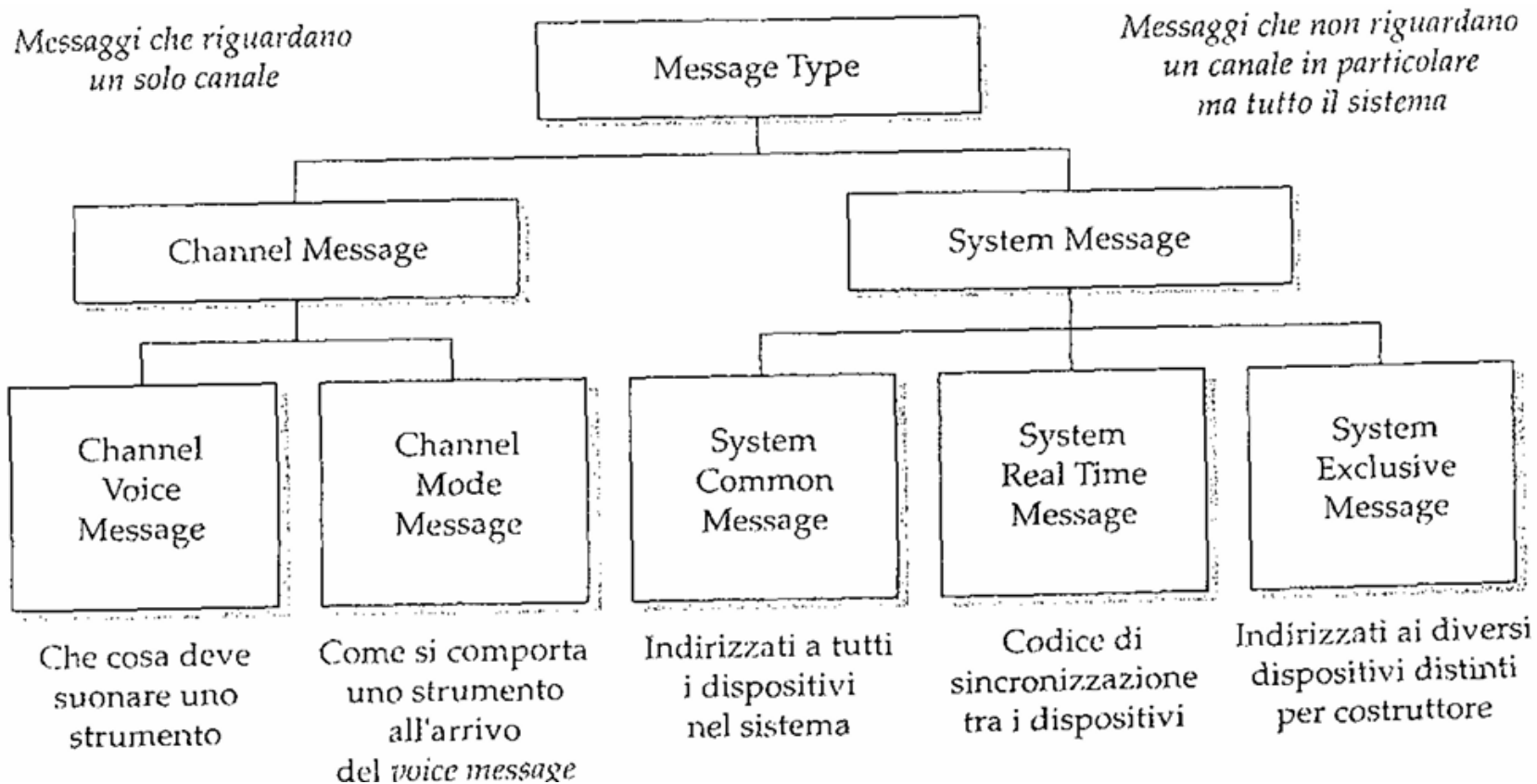
- **Patches**

- *Pitch* produced by a generator
- Each channel is associated to one patch



Source: Audio e Multimedia – Valle/Lombardo

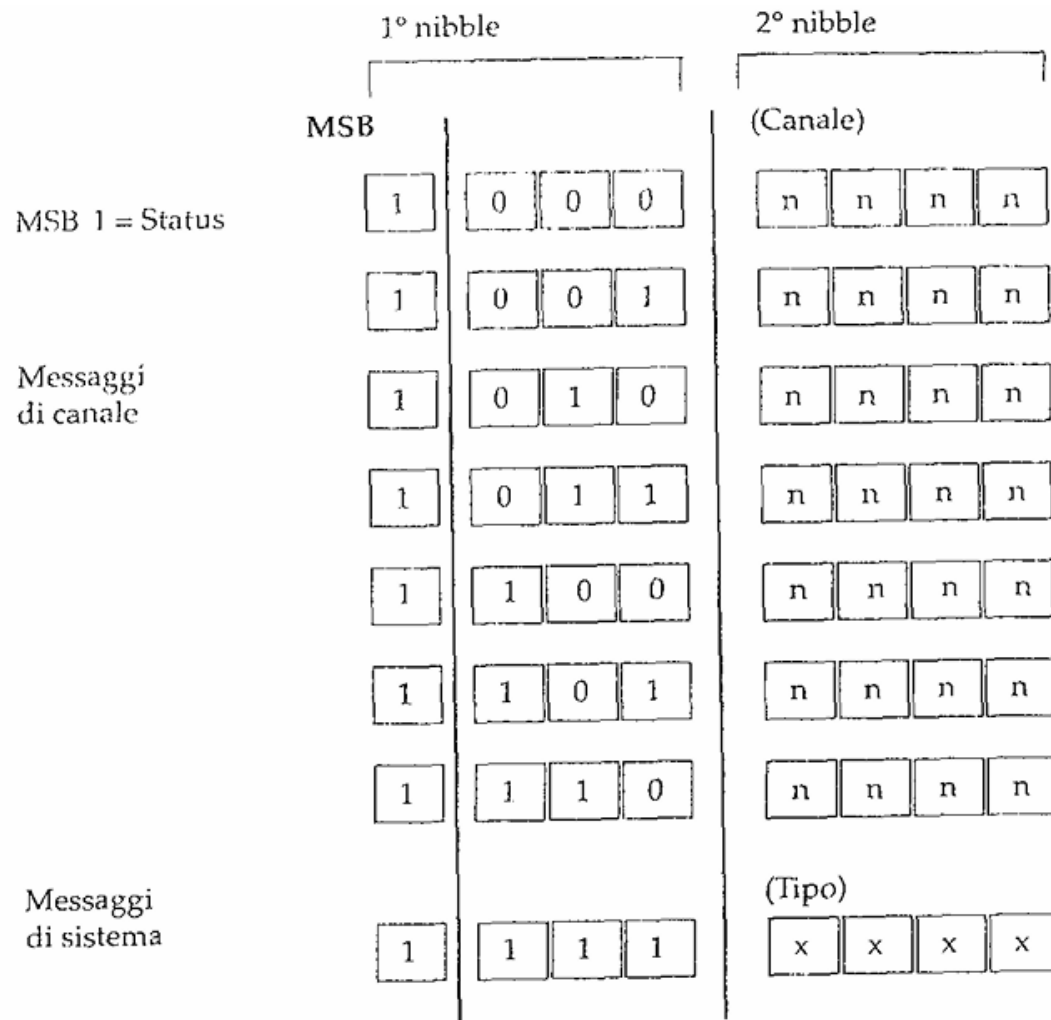
# Types of messages



Source: Audio e Multimedia – Valle/Lombardo



# Structure of messages



Source: Audio e Multimedia – Valle/Lombardo



# Channel messages

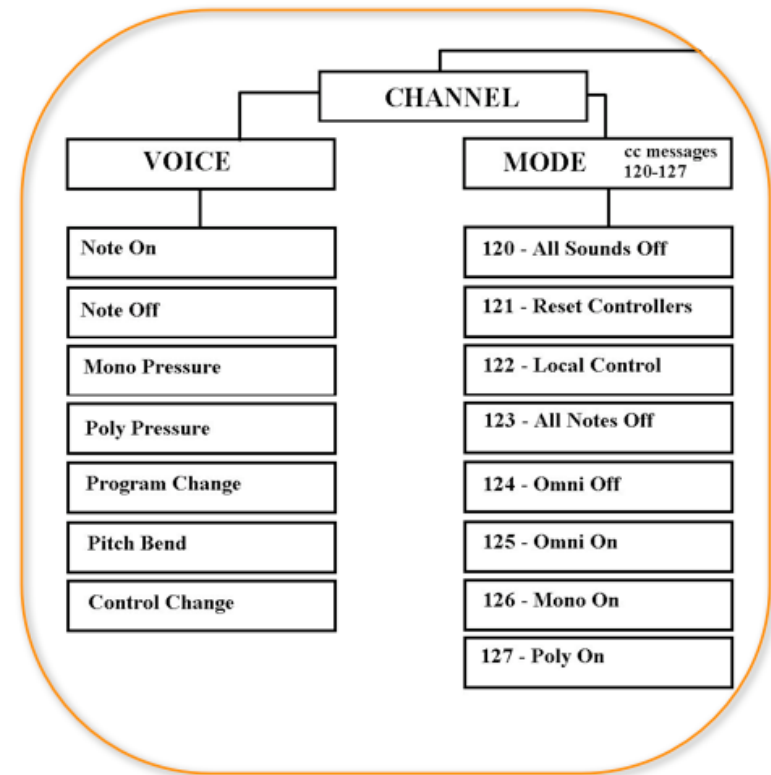


## - Voice messages

- Musical events to be played by an instrument
- There are different types
  - *Note On / Note Off*
  - *Channel / Polyphonic Key Pressure*
  - *Pitch Bend / Program / Control Change*

## - Mode messages

- How an instrument behaves when voices messages arrive
- There are different types
  - *Omni On / Omni Off*
  - *Mono / Poly*



Source: Wikiaudio



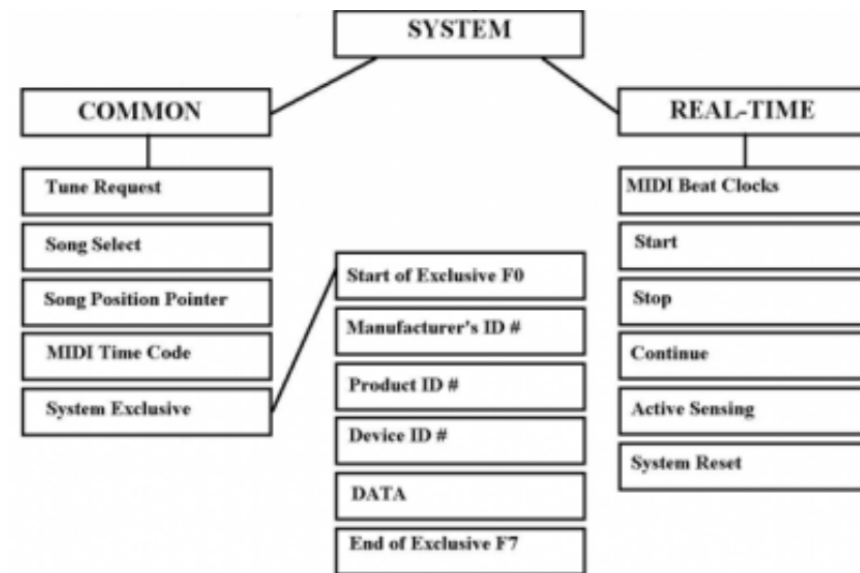
# System messages

## - Common messages

- *General system functions* across the system
- There are different types
  - *Song Select / Song Position Pointer*
  - *Tune Request*

## - Real-time messages

- Synchronization of different system modules
- There are different types
  - *MIDI Clock*
  - *System Reset*
  - *Start/Continue/Stop*



Source: Wikiaudio

## - Exclusive messages

- Non-standard messages for specific manufacturers





# General MIDI Mode



- Encoding specifying a priori channels/patches/timbres association
- All compliant MIDI instruments meet a certain set of features and presets
- GM attaches specific interpretations to many parameters
- There is no standard way to associate patches to a particular channel
  - E.g., Roland/Yamaha defined their own internal standards

|                         |    |                         |
|-------------------------|----|-------------------------|
| Acoustic Bass Drum (35) | B1 |                         |
| Electric Bass Drum (36) | C2 |                         |
| Acoustic Snare (38)     | D2 | C#2 (37) Side Stick     |
| Electric Snare (40)     | E2 | D#2 (39) Hand Clap      |
| Low Floor Tom (41)      | F2 |                         |
| High Floor Tom (43)     | G2 | F#2 (42) Closed Hi-Hat  |
| Low Tom (45)            | A2 | G#2 (44) Pedal Hi-Hat   |
| Low-Mid Tom (47)        | B2 | A#2 (46) Open Hi-Hat    |
| Hi-Mid Tom (48)         | C3 |                         |
| High Tom (50)           | D3 | C#3 (49) Crash Cymbal 1 |
| Chinese Cymbal (52)     | E3 | D#3 (51) Ride Cymbal 1  |
| Ride Bell (53)          | F3 |                         |
| Splash Cymbal (55)      | G3 | F#3 (54) Tambourine     |
| Crash Cymbal 2 (57)     | A3 | G#3 (56) Cowbell        |
| Ride Cymbal 2 (59)      | B3 | A#3 (58) Vibraslap      |
| Hi Bongo (60)           | C4 | <middle C>              |
| Mute Hi Conga (62)      | D4 | C#4 (61) Low Bongo      |
| Low Conga (64)          | E4 | D#4 (63) Open Hi Conga  |
| High Timbale (65)       | F4 |                         |
| High Agogo (67)         | G4 | F#4 (66) Low Timbale    |
| Cabasa (69)             | A4 | G#4 (68) Low Agogo      |
| Short Whistle (71)      | B4 | A#4 (70) Maracas        |
| Long Whistle (72)       | C5 |                         |
| Long Guiro (74)         | D5 | C#5 (73) Short Guiro    |
| Hi Wood Block (76)      | E5 | D#5 (75) Claves         |
| Low Wood Block (77)     | F5 |                         |
| Open Cuica (79)         | G5 | F#5 (78) Mute Cuica     |
| Open Triangle (81)      | A5 | G#5 (80) Mute Triangle  |

Source: Wikipedia



# Devices and connections



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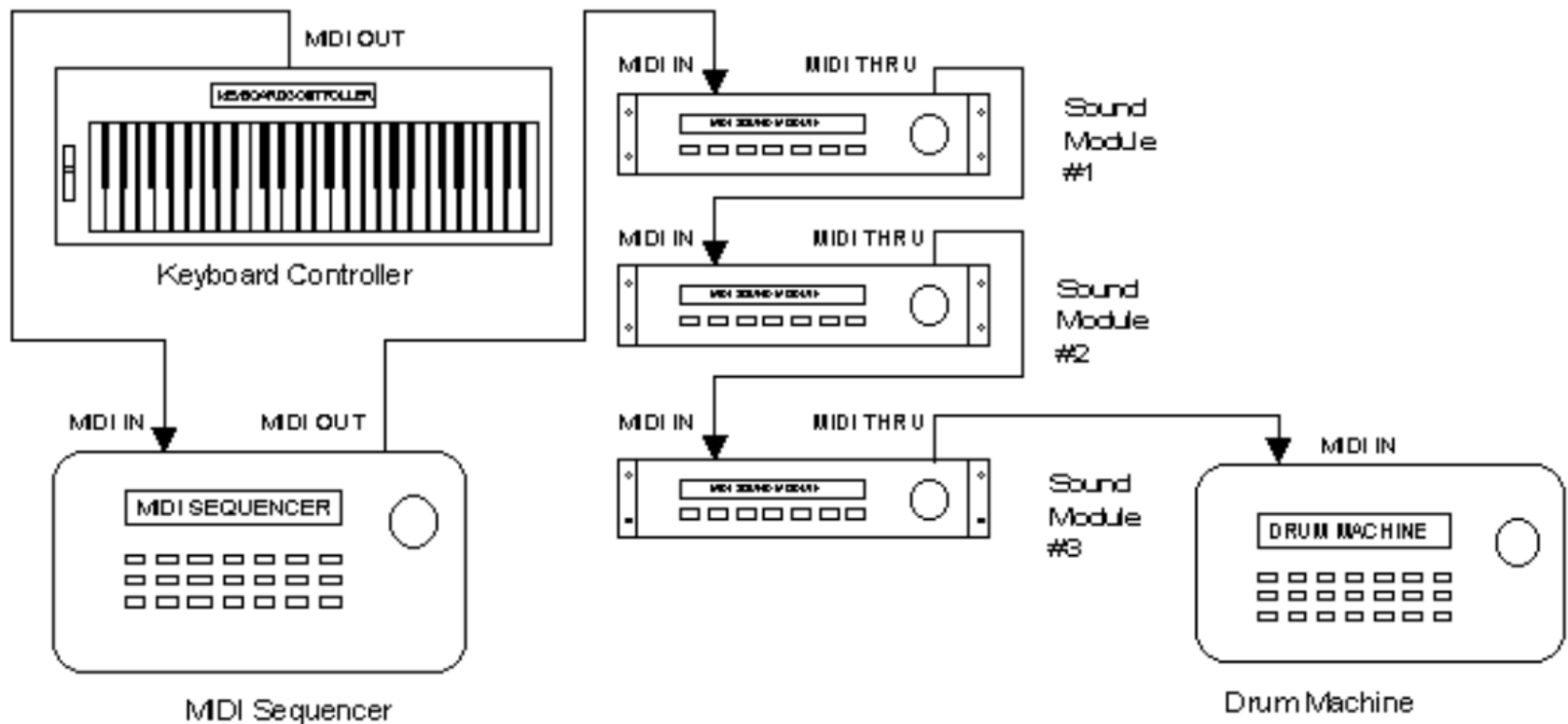
- MIDI also establishes which physical connections should be made (*interfaces*), via DIN connectors
- There are three *types* of ports: In/Out/Thru
- They can easily form a network providing *interconnectivity* between different *devices* (e.g., daisy chaining, Thru Boxes)



Source: MIDI 1.0 Specifications



# A MIDI System Example



Source: [academictutorials.com](http://academictutorials.com)

# Conclusions



## Pros

- Very flexible and editable in instruments configuration
- Files are very small and generally sound good
- It allows for easy editing for both professionals/amateurs
- Can be used both for modern and vintage technology

## Cons

- It depends on the quality of chosen playback devices
- Encodes only standard music and uses only 60 channels
- Limited addressing with 16 channels
- Requires specific hardware

