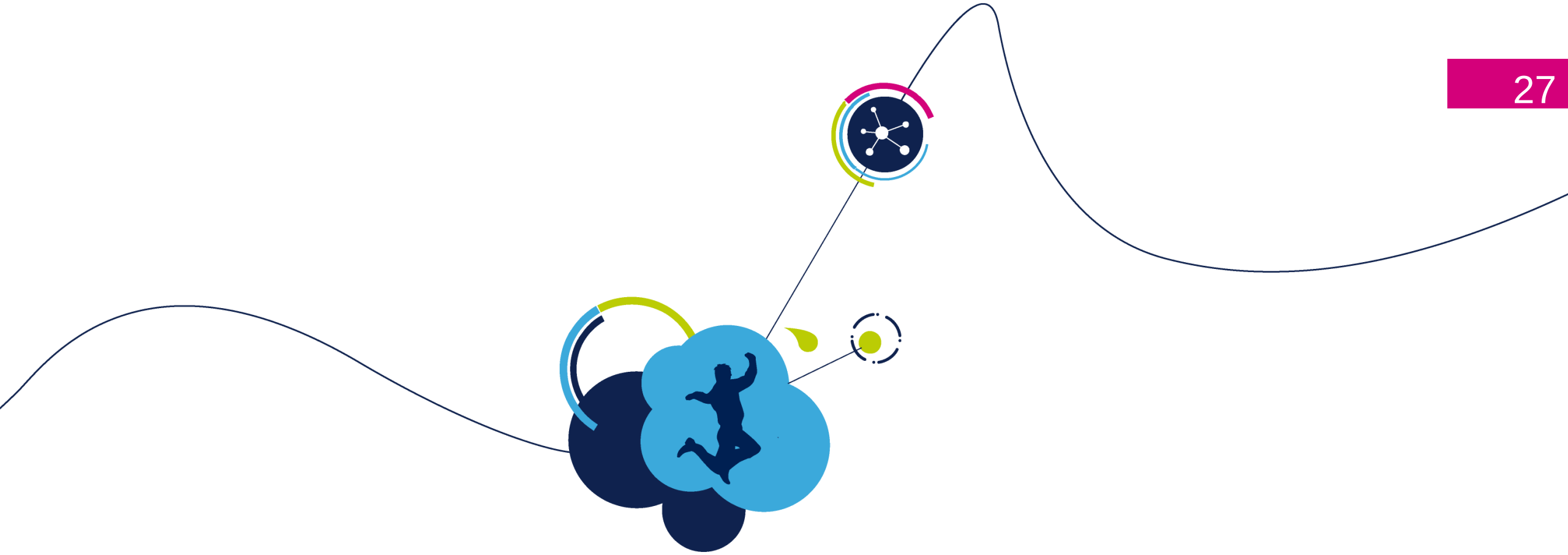


VCP Zero Length Packet

VCP Zero Length Packet

- According to USB specification communication shall end with packet shorter than packet maximal size or packet with zero length

contain the remaining data. A bulk transfer is complete when the endpoint does one of the following:

- Has transferred exactly the amount of data expected
- Transfers a packet with a payload size less than *wMaxPacketSize* or transfers a zero-length packet

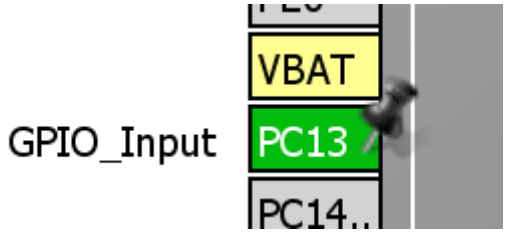
USB specification 2.0 Chapter 5.8.3

Windows use in VCP this condition as end of transfer

- This condition needs to be on Windows system, otherwise communication wont be visible in user application

USB VCP SWD debug output

- Again use the project from USB VCP Device lab
- In CubeMX add PC13(Button) pin as input
  - It will help with problem demonstration and protect terminal from spamming



- And regenerate code
  - No need to do any other changes

VCP Zero Length Packet

- Include the usbd_cdc_if.h into main.c
  - This allow usage of Transmit function from main.c

```
/* USER CODE BEGIN Includes */
#include "usbd_cdc_if.h"
/* USER CODE END Includes */
```

- Create buffer and buffer length variable and variable for loop limiting purpose, define extern USB handle(only for OTG devices)

```
/* USER CODE BEGIN PFP */
/* Private function prototypes -----------------------------------------------*/
#define LENGTH 64u
uint8_t buffer[LENGTH];
uint8_t count=0;
extern USBD_HandleTypeDef hUsbDeviceFS;
/* USER CODE END PFP */
```

VCP Zero Length Packet

- We will wait on PA0 button press
  - After that program sent 5x buffer 64byte length
- But in windows terminal no data will be received

```
/* USER CODE BEGIN 2 */
while(HAL_GPIO_ReadPin(GPIOC,GPIO_PIN_13)==GPIO_PIN_RESET){}
  while(count<5){
    if(((USBD_CDC_HandleTypeDef*)(hUsbDeviceFS.pClassData))->TxState==0){
      if(CDC_Transmit_FS(buffer,LENGTH)==USBD_OK){
        count++;
      }
    }
  }

/* USER CODE END 2 */
```

- Now try to decrease LENGTH to for example 63

VCP Zero Length Packet

- Same situation as on previous slide but now we send zero length packet on the end (LENGTH is 64)

```
/* USER CODE BEGIN 2 */
while(HAL_GPIO_ReadPin(GPIOC,GPIO_PIN_13)==GPIO_PIN_RESET){}
  while(count<5){
    if(((USBD_CDC_HandleTypeDef*)(hUsbDeviceFS.pClassData))->TxState==0){
      if(CDC_Transmit_FS(buffer,LENGTH)==USBD_OK){
        count++;
      }
    }
  }
while(((USBD_CDC_HandleTypeDef*)(hUsbDeviceFS.pClassData))->TxState!=0){}
  CDC_Transmit_FS(buffer,0);

 /* USER CODE END 2 */
```

Check if is possible send data and ZLP send

- Now windows terminal will receive data