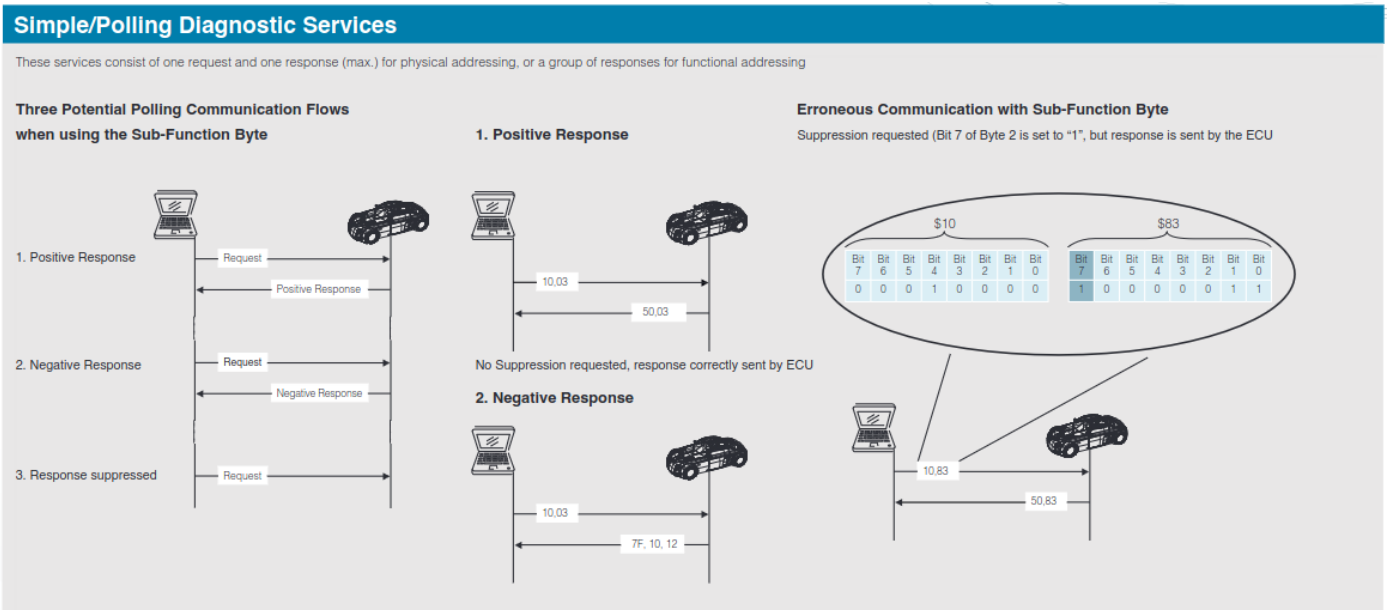
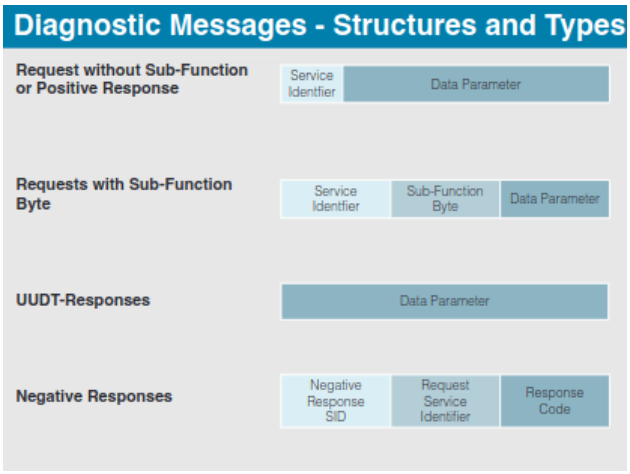
16.4.

https://automotive.softing.com/fileadmin/sof-files/pdf/de/ae/poster/UDS_Faltposter_softing2016.pdf

- UDS_Faltposter_softing2016.pdf





Izgleda da Scapy vec ima implementiran i UDS protokol

17.4.

https://munich.dissec.to/kb/chapters/uds/uds-scapy.html
https://scapy.readthedocs.io/en/latest/layers/automotive.html#layers
koristenje:

```
❯ echo "63 42" | isotpsend -s 101 -d 100 vcan0
❯ echo "23 42" | isotpsend -s 101 -d 100 vcan0
```

```
>>> s = ISOTPNativeSocket(iface="vcan0", tx_id=0x100, rx_id=0x101, basecls=UDS)
>>> while True:
...     s.recv()
```

```
...
<UDS  service=ReadMemoryByAddressPositiveResponse |<UDS_RMBAPR  dataRecord='B' |>>
<UDS  service=ReadMemoryByAddress |<UDS_RMBA  memorySizeLen=4 memoryAddressLen=2 |>>
```

zadatak za Hackultet

1. opcija

- napraviti mali binary sa zastavicom koji bi trebao biti primjer ECU programa
- napraviti ga dosutpnim putem UDS ReadMemoryByAddress servisa
- natjecatelj mora odskenirati ECU s caringcaribouom ili scapyem, i iskoristiti ReadMemoryByAddress servis da dohvati binary
  - parametre za read memory by address (32 bitna adresa) moze iscitati iz zadatka ili nekog identifiera
- binary potom treba reverzati i iz njega izvuci flag

2. opcija

- potrebno je koristeci ReadDataByIdentifier saznati koji nesigurni algoritam se koristi za Authentication servis (primjerice SHA2 se potpuno krivo koristi za generiranje kljuca iz dobivenog seed-a)
  - ovo se mozda moze iscitati i iz drugog ECU-a
- prva zastavica moze se dohvatiti iz nekog drugog identifera
- nakon autentificiranja korisnik moze koristiti ReadMemoryByAddress kao u prvom zadatku da dohvati program ECU-a iz memorije i iz njega izvuce drugu zastavicu

scapy ReadMemoryByAddress

```
class UDS_RMBA(Packet):
    name = 'ReadMemoryByAddress'
    fields_desc = [
        BitField( name: 'memorySizeLen',  default: 0,  size: 4),
        BitField( name: 'memoryAddressLen',  default: 0,  size: 4),
        ConditionalField(XByteField( name: 'memoryAddress1',  default: 0),
                         lambda pkt: pkt.memoryAddressLen == 1),
        ConditionalField(XShortField( name: 'memoryAddress2',  default: 0),
                         lambda pkt: pkt.memoryAddressLen == 2),
        ConditionalField(X3BytesField( name: 'memoryAddress3',  default: 0),
                         lambda pkt: pkt.memoryAddressLen == 3),
        ConditionalField(XIntField( name: 'memoryAddress4',  default: 0),
                         lambda pkt: pkt.memoryAddressLen == 4),
        ConditionalField(XByteField( name: 'memorySize1',  default: 0),
                         lambda pkt: pkt.memorySizeLen == 1),
        ConditionalField(XShortField( name: 'memorySize2',  default: 0),
                         lambda pkt: pkt.memorySizeLen == 2),
        ConditionalField(X3BytesField( name: 'memorySize3',  default: 0),
                         lambda pkt: pkt.memorySizeLen == 3),
        ConditionalField(XIntField( name: 'memorySize4',  default: 0),
                         lambda pkt: pkt.memorySizeLen == 4),
    ]
```

18.4.

scapy prepoznaje je li neki paket odgovor na neki drugi koristeci answers metodu svakog paketa, primjerice je li dobiveni UDS_ERPR paket odgovor na poslani UDS_PR:

```
class UDS_ERPR(Packet):
    name = 'ECUResetPositiveResponse'
    fields_desc = [
        ByteEnumField( name: 'resetType',  default: 0, UDS_ER.resetTypes),
        ConditionalField(ByteField( name: 'powerDownTime',  default: 0),
                         lambda pkt: pkt.resetType == 0x04)
    ]

    def answers(self, other):
        return isinstance(other, UDS_ER) and other.resetType == self.resetType
```

da bi ovo ispravno radilo, potrebno je socketu specificirati basecls paketa, odnosno aplikacijski sloj, u nasem slucaju isotp socketu je potrebno specificirati UDS kao basecls, jer ce koristiti UDS.answers kao pocetnu metodu iz koje se kasnije poziva answers odredjenog tipa paketa, primjerice UDS_ERPR.answers:

```
class UDS(ISOTP):
    name = 'UDS'
    fields_desc = [
        XByteEnumField( name: 'service',  default: 0, services)
    ]

    def answers(self, other):
        # type: (Union[UDS, Packet]) -> bool
        if other.__class__ != self.__class__:
            return False
        if self.service == 0x7f:
            return self.payload.answers(other)
        if self.service == (other.service + 0x40):
            if isinstance(self.payload, NoPayload) or \
                    isinstance(other.payload, NoPayload):
                return len(self) <= len(other)
            else:
                return self.payload.answers(other.payload)
        return False
```

19.4.

Prekodirao sve iz python-can-a u scapy.