# VoIP Feature Categorization

## 1. Packet Length & Size Features

* pkt\_len\_min, pkt\_len\_max, pkt\_len\_mean, pkt\_len\_std, pkt\_len\_var
* pkt\_size\_avg
* fwd\_pkt\_len\_min/max/mean/std, bwd\_pkt\_len\_min/max/mean/std
* fwd\_seg\_size\_avg, bwd\_seg\_size\_avg, fwd\_seg\_size\_min
* ✔️ Covers all packet size distribution features.

## 2. Byte/Packet Counters & Ratios

* totlen\_fwd\_pkts, totlen\_bwd\_pkts, tot\_fwd\_pkts, tot\_bwd\_pkts
* subflow\_fwd\_byts, subflow\_bwd\_byts, subflow\_fwd\_pkts, subflow\_bwd\_pkts
* fwd\_act\_data\_pkts, flow\_byts\_s, flow\_pkts\_s
* down\_up\_ratio
* fwd\_pkts\_b\_avg, bwd\_pkts\_b\_avg, fwd\_byts\_b\_avg, bwd\_byts\_b\_avg
* ✔️ Captures volume, rate, direction balance features.

## 3. Inter-Arrival Time (IAT) & Flow Timing

* fwd\_iat\_tot, bwd\_iat\_tot
* fwd\_iat\_mean/max/min/std, bwd\_iat\_mean/max/min/std
* flow\_iat\_mean/max/min/std/min
* flow\_duration
* idle\_mean/std/min/max, active\_mean/std/min/max
* ✔️ Covers time dynamics.

## 4. TCP/Control Flags & Header Features

* ack\_flag\_cnt, psh\_flag\_cnt, fwd\_psh\_flags, bwd\_psh\_flags
* fin\_flag\_cnt, syn\_flag\_cnt, urg\_flag\_cnt, cwr\_flag\_count, ece\_flag\_cnt, rst\_flag\_cnt
* fwd\_header\_len, bwd\_header\_len
* init\_fwd\_win\_byts, init\_bwd\_win\_byts
* protocol
* ✔️ Includes TCP behavior, headers, protocol.

## 5. Block Rate & Throughput Features

* fwd\_blk\_rate\_avg, bwd\_blk\_rate\_avg
* ✔️ Straightforward — both block rate features fit here.

## 6. Port & Protocol Features

* src\_port, dst\_port
* ✔️ Captures identifiers of flows.