Data Output from F1® 24 Game

Contents

Overview

The F1® 24 Game supports the output of certain game data across UDP connections. This data can be used supply race information to external applications, or to drive certain hardware (e.g. motion platforms, force feedback steering wheels and LED devices).

The following information summarise these data structures so that developers of supporting hardware or software can configure these to work correctly with the F1® 24 Game.

Note: *To ensure that you are using the latest specification for this game, please check our official forum page here.*

If you cannot find the information that you require then please contact the team via the official forum thread listed above. For any bugs with the UDP system, please post a new bug report on the F1® 24 Game forum.

Packet Information

Packet Types

Each packet carries different types of data rather than having one packet which contains everything. The header in each packet describes the packet type and versioning info so it will be easier for applications to check they are interpreting the incoming data in the correct way. Please note that all values are encoded using Little Endian format. All data is packed.

The following data types are used in the structures:

Type	Description
uint8	Unsigned 8-bit integer
int8	Signed 8-bit integer
uint16	Unsigned 16-bit integer
int16	Signed 16-bit integer
uint32	Unsigned 32-bit integer
float	Floating point (32-bit)
double	Double-precision floating point (64-bit)
uint64	Unsigned 64-bit integer
char	Character

Packet Header

Each packet has the following header:

```
struct PacketHeader
{
    uint16    m_packetFormat;            // 2024
    uint8     m_gameYear;                // Game year - last two digits e.g. 24
    uint8     m_gameMajorVersion;        // Game major version - "X.00"
    uint8     m_gameMinorVersion;        // Game minor version - "1.XX"
    uint8     m_packetVersion;           // Version of this packet type, all start from 1
    uint8     m_packetId;                // Identifier for the packet type, see below
    uint64    m_sessionUID;              // Unique identifier for the session
    float     m_sessionTime;             // Session timestamp
    uint32    m_frameIdentifier;         // Identifier for the frame the data was retrieved on
    uint32    m_overallFrameIdentifier;  // Overall identifier for the frame the data was retrieved
                                         // on, doesn't go back after flashbacks
    uint8     m_playerCarIndex;          // Index of player's car in the array
    uint8     m_secondaryPlayerCarIndex; // Index of secondary player's car in the array (splitscreen)
                                         // 255 if no second player
};
```

Packet IDs

The packets IDs are as follows:

Packet Name	Value	Description
Motion	0	Contains all motion data for player's car – only sent while player is in control
Session	1	Data about the session – track, time left
Lap Data	2	Data about all the lap times of cars in the session
Event	3	Various notable events that happen during a session

Participants	4	List of participants in the session, mostly relevant for multiplayer
Car Setups	5	Packet detailing car setups for cars in the race
Car Telemetry	6	Telemetry data for all cars
Car Status	7	Status data for all cars
Final Classification	8	Final classification confirmation at the end of a race
Lobby Info	9	Information about players in a multiplayer lobby
Car Damage	10	Damage status for all cars
Session History	11	Lap and tyre data for session
Tyre Sets	12	Extended tyre set data
Motion Ex	13	Extended motion data for player car
Time Trial	14	Time Trial specific data

Motion Packet

The motion packet gives physics data for all the cars being driven.
N.B. For the normalised vectors below, to convert to float values divide by 32767.0f – 16-bit signed values are used to pack the data and on the assumption that direction values are always between -1.0f and 1.0f.

Frequency: Rate as specified in menus
Size: 1349 bytes
Version: 1

```
struct CarMotionData
{
    float         m_worldPositionX;           // World space X position - metres
    float         m_worldPositionY;           // World space Y position
    float         m_worldPositionZ;           // World space Z position
    float         m_worldVelocityX;           // Velocity in world space X – metres/s
    float         m_worldVelocityY;           // Velocity in world space Y
    float         m_worldVelocityZ;           // Velocity in world space Z
    int16         m_worldForwardDirX;         // World space forward X direction (normalised)
    int16         m_worldForwardDirY;         // World space forward Y direction (normalised)
    int16         m_worldForwardDirZ;         // World space forward Z direction (normalised)
    int16         m_worldRightDirX;           // World space right X direction (normalised)
    int16         m_worldRightDirY;           // World space right Y direction (normalised)
    int16         m_worldRightDirZ;           // World space right Z direction (normalised)
    float         m_gForceLateral;            // Lateral G-Force component
    float         m_gForceLongitudinal;       // Longitudinal G-Force component
    float         m_gForceVertical;           // Vertical G-Force component
    float         m_yaw;                      // Yaw angle in radians
    float         m_pitch;                    // Pitch angle in radians
    float         m_roll;                     // Roll angle in radians
};

struct PacketMotionData
{
    PacketHeader    m_header;                   // Header

    CarMotionData   m_carMotionData[22];        // Data for all cars on track
};
```

Session Packet

The session packet includes details about the current session in progress.

Frequency: 2 per second
Size: 753 bytes
Version: 1

```
struct MarshalZone
{
    float  m_zoneStart;   // Fraction (0..1) of way through the lap the marshal zone starts
    int8   m_zoneFlag;    // -1 = invalid/unknown, 0 = none, 1 = green, 2 = blue, 3 = yellow
};

struct WeatherForecastSample
{
    uint8     m_sessionType;              // 0 = unknown, see appendix
    uint8     m_timeOffset;               // Time in minutes the forecast is for
    uint8     m_weather;                  // Weather - 0 = clear, 1 = light cloud, 2 = overcast
                                          // 3 = light rain, 4 = heavy rain, 5 = storm
    int8      m_trackTemperature;         // Track temp. in degrees Celsius
    int8      m_trackTemperatureChange;   // Track temp. change – 0 = up, 1 = down, 2 = no change
    int8      m_airTemperature;           // Air temp. in degrees celsius
    int8      m_airTemperatureChange;     // Air temp. change – 0 = up, 1 = down, 2 = no change
    uint8     m_rainPercentage;           // Rain percentage (0-100)
};

struct PacketSessionData
{
    PacketHeader    m_header;                  // Header

    uint8           m_weather;                 // Weather - 0 = clear, 1 = light cloud, 2 = overcast
                                               // 3 = light rain, 4 = heavy rain, 5 = storm
    int8            m_trackTemperature;        // Track temp. in degrees celsius
    int8            m_airTemperature;          // Air temp. in degrees celsius
    uint8           m_totalLaps;               // Total number of laps in this race
    uint16          m_trackLength;             // Track length in metres
    uint8           m_sessionType;             // 0 = unknown, see appendix
    int8            m_trackId;                 // -1 for unknown, see appendix
    uint8           m_formula;                 // Formula, 0 = F1 Modern, 1 = F1 Classic, 2 = F2,
                                               // 3 = F1 Generic, 4 = Beta, 6 = Esports
                                               // 8 = F1 World, 9 = F1 Elimination
    uint16          m_sessionTimeLeft;         // Time left in session in seconds
    uint16          m_sessionDuration;         // Session duration in seconds
    uint8           m_pitSpeedLimit;           // Pit speed limit in kilometres per hour
    uint8           m_gamePaused;              // Whether the game is paused – network game only
    uint8           m_isSpectating;            // Whether the player is spectating
    uint8           m_spectatorCarIndex;       // Index of the car being spectated
    uint8           m_sliProNativeSupport;     // SLI Pro support, 0 = inactive, 1 = active
    uint8           m_numMarshalZones;         // Number of marshal zones to follow
    MarshalZone     m_marshalZones[21];        // List of marshal zones – max 21
    uint8           m_safetyCarStatus;         // 0 = no safety car, 1 = full
                                               // 2 = virtual, 3 = formation lap
    uint8           m_networkGame;             // 0 = offline, 1 = online
    uint8           m_numWeatherForecastSamples; // Number of weather samples to follow
    WeatherForecastSample m_weatherForecastSamples[64];   // Array of weather forecast samples
    uint8           m_forecastAccuracy;        // 0 = Perfect, 1 = Approximate
    uint8           m_aiDifficulty;            // AI Difficulty rating – 0-110
    uint32          m_seasonLinkIdentifier;    // Identifier for season - persists across saves
    uint32          m_weekendLinkIdentifier;   // Identifier for weekend - persists across saves
    uint32          m_sessionLinkIdentifier;   // Identifier for session - persists across saves
    uint8           m_pitStopWindowIdealLap;   // Ideal lap to pit on for current strategy (player)
    uint8           m_pitStopWindowLatestLap;  // Latest lap to pit on for current strategy (player)
    uint8           m_pitStopRejoinPosition;   // Predicted position to rejoin at (player)
    uint8           m_steeringAssist;          // 0 = off, 1 = on
    uint8           m_brakingAssist;           // 0 = off, 1 = low, 2 = medium, 3 = high
    uint8           m_gearboxAssist;           // 1 = manual, 2 = manual & suggested gear, 3 = auto
    uint8           m_pitAssist;               // 0 = off, 1 = on
    uint8           m_pitReleaseAssist;        // 0 = off, 1 = on
    uint8           m_ERSAssist;               // 0 = off, 1 = on
    uint8           m_DRSAssist;               // 0 = off, 1 = on
    uint8           m_dynamicRacingLine;       // 0 = off, 1 = corners only, 2 = full
    uint8           m_dynamicRacingLineType;   // 0 = 2D, 1 = 3D
    uint8           m_gameMode;                // Game mode id - see appendix
    uint8           m_ruleSet;                 // Ruleset - see appendix
```

```
    uint32          m_timeOfDay;                // Local time of day - minutes since midnight
    uint8           m_sessionLength;            // 0 = None, 2 = Very Short, 3 = Short, 4 = Medium
                                                // 5 = Medium Long, 6 = Long, 7 = Full
    uint8    m_speedUnitsLeadPlayer;            // 0 = MPH, 1 = KPH
    uint8    m_temperatureUnitsLeadPlayer;      // 0 = Celsius, 1 = Fahrenheit
    uint8    m_speedUnitsSecondaryPlayer;       // 0 = MPH, 1 = KPH
    uint8    m_temperatureUnitsSecondaryPlayer; // 0 = Celsius, 1 = Fahrenheit
    uint8    m_numSafetyCarPeriods;             // Number of safety cars called during session
    uint8    m_numVirtualSafetyCarPeriods;      // Number of virtual safety cars called
    uint8    m_numRedFlagPeriods;               // Number of red flags called during session
    uint8    m_equalCarPerformance;             // 0 = Off, 1 = On
    uint8    m_recoveryMode;                    // 0 = None, 1 = Flashbacks, 2 = Auto-recovery
    uint8    m_flashbackLimit;                  // 0 = Low, 1 = Medium, 2 = High, 3 = Unlimited
    uint8    m_surfaceType;                     // 0 = Simplified, 1 = Realistic
    uint8    m_lowFuelMode;                     // 0 = Easy, 1 = Hard
    uint8    m_raceStarts;                      // 0 = Manual, 1 = Assisted
    uint8    m_tyreTemperature;                 // 0 = Surface only, 1 = Surface & Carcass
    uint8    m_pitLaneTyreSim;                  // 0 = On, 1 = Off
    uint8    m_carDamage;                       // 0 = Off, 1 = Reduced, 2 = Standard, 3 = Simulation
    uint8    m_carDamageRate;                   // 0 = Reduced, 1 = Standard, 2 = Simulation
    uint8    m_collisions;                      // 0 = Off, 1 = Player-to-Player Off, 2 = On
    uint8    m_collisionsOffForFirstLapOnly;    // 0 = Disabled, 1 = Enabled
    uint8    m_mpUnsafePitRelease;              // 0 = On, 1 = Off (Multiplayer)
    uint8    m_mpOffForGriefing;                // 0 = Disabled, 1 = Enabled (Multiplayer)
    uint8    m_cornerCuttingStringency;         // 0 = Regular, 1 = Strict
    uint8    m_parcFermeRules;                  // 0 = Off, 1 = On
    uint8    m_pitStopExperience;               // 0 = Automatic, 1 = Broadcast, 2 = Immersive
    uint8    m_safetyCar;                       // 0 = Off, 1 = Reduced, 2 = Standard, 3 = Increased
    uint8    m_safetyCarExperience;             // 0 = Broadcast, 1 = Immersive
    uint8    m_formationLap;                    // 0 = Off, 1 = On
    uint8    m_formationLapExperience;          // 0 = Broadcast, 1 = Immersive
    uint8    m_redFlags;                        // 0 = Off, 1 = Reduced, 2 = Standard, 3 = Increased
    uint8    m_affectsLicenceLevelSolo;         // 0 = Off, 1 = On
    uint8    m_affectsLicenceLevelMP;           // 0 = Off, 1 = On
    uint8    m_numSessionsInWeekend;            // Number of session in following array
    uint8    m_weekendStructure[12];            // List of session types to show weekend
                                                // structure - see appendix for types
    float    m_sector2LapDistanceStart;         // Distance in m around track where sector 2 starts
    float    m_sector3LapDistanceStart;         // Distance in m around track where sector 3 starts
};
```

Lap Data Packet

The lap data packet gives details of all the cars in the session.

Frequency: Rate as specified in menus
Size: 1285 bytes
Version: 1

```
struct LapData
{
    uint32   m_lastLapTimeInMS;           // Last lap time in milliseconds
    uint32   m_currentLapTimeInMS;        // Current time around the lap in milliseconds
    uint16   m_sector1TimeMSPart;         // Sector 1 time milliseconds part
    uint8    m_sector1TimeMinutesPart;    // Sector 1 whole minute part
    uint16   m_sector2TimeMSPart;         // Sector 2 time milliseconds part
    uint8    m_sector2TimeMinutesPart;    // Sector 2 whole minute part
    uint16   m_deltaToCarInFrontMSPart;   // Time delta to car in front milliseconds part
    uint8    m_deltaToCarInFrontMinutesPart; // Time delta to car in front whole minute part
    uint16   m_deltaToRaceLeaderMSPart;      // Time delta to race leader milliseconds part
    uint8    m_deltaToRaceLeaderMinutesPart; // Time delta to race leader whole minute part
    float    m_lapDistance;               // Distance vehicle is around current lap in metres – could
                                          // be negative if line hasn't been crossed yet
    float    m_totalDistance;             // Total distance travelled in session in metres – could
                                          // be negative if line hasn't been crossed yet
    float    m_safetyCarDelta;            // Delta in seconds for safety car
    uint8    m_carPosition;               // Car race position
```

```
    uint8    m_currentLapNum;             // Current lap number
    uint8    m_pitStatus;                 // 0 = none, 1 = pitting, 2 = in pit area
    uint8    m_numPitStops;               // Number of pit stops taken in this race
    uint8    m_sector;                    // 0 = sector1, 1 = sector2, 2 = sector3
    uint8    m_currentLapInvalid;         // Current lap invalid - 0 = valid, 1 = invalid
    uint8    m_penalties;                 // Accumulated time penalties in seconds to be added
    uint8    m_totalWarnings;             // Accumulated number of warnings issued
    uint8    m_cornerCuttingWarnings;     // Accumulated number of corner cutting warnings issued
    uint8    m_numUnservedDriveThroughPens;  // Num drive through pens left to serve
    uint8    m_numUnservedStopGoPens;        // Num stop go pens left to serve
    uint8    m_gridPosition;              // Grid position the vehicle started the race in
    uint8    m_driverStatus;              // Status of driver - 0 = in garage, 1 = flying lap
                                          // 2 = in lap, 3 = out lap, 4 = on track
    uint8    m_resultStatus;              // Result status - 0 = invalid, 1 = inactive, 2 = active
                                          // 3 = finished, 4 = didnotfinish, 5 = disqualified
                                          // 6 = not classified, 7 = retired
    uint8    m_pitLaneTimerActive;        // Pit lane timing, 0 = inactive, 1 = active
    uint16   m_pitLaneTimeInLaneInMS;     // If active, the current time spent in the pit lane in ms
    uint16   m_pitStopTimerInMS;          // Time of the actual pit stop in ms
    uint8    m_pitStopShouldServePen;     // Whether the car should serve a penalty at this stop
    float    m_speedTrapFastestSpeed;     // Fastest speed through speed trap for this car in kmph
    uint8    m_speedTrapFastestLap;       // Lap no the fastest speed was achieved, 255 = not set
};


struct PacketLapData
{
    PacketHeader    m_header;              // Header

    LapData         m_lapData[22];         // Lap data for all cars on track

    uint8       m_timeTrialPBCarIdx;     // Index of Personal Best car in time trial (255 if invalid)
    uint8       m_timeTrialRivalCarIdx;  // Index of Rival car in time trial (255 if invalid)
};
```

Event Packet

This packet gives details of events that happen during the course of a session.

Frequency: When the event occurs
Size: 45 bytes
Version: 1

```
// The event details packet is different for each type of event.
// Make sure only the correct type is interpreted.
union EventDataDetails
{
    struct
    {
        uint8    vehicleIdx; // Vehicle index of car achieving fastest lap
        float    lapTime;    // Lap time is in seconds
    } FastestLap;

    struct
    {
        uint8    vehicleIdx; // Vehicle index of car retiring
    } Retirement;

    struct
    {
        uint8    vehicleIdx; // Vehicle index of team mate
    } TeamMateInPits;

    struct
    {
        uint8    vehicleIdx; // Vehicle index of the race winner
```

```
    } RaceWinner;

    struct
    {
        uint8 penaltyType;              // Penalty type – see Appendices
        uint8 infringementType;         // Infringement type – see Appendices
        uint8 vehicleIdx;               // Vehicle index of the car the penalty is applied to
        uint8 otherVehicleIdx;          // Vehicle index of the other car involved
        uint8 time;                     // Time gained, or time spent doing action in seconds
        uint8 lapNum;                   // Lap the penalty occurred on
        uint8 placesGained;             // Number of places gained by this
    } Penalty;

    struct
    {
        uint8 vehicleIdx;               // Vehicle index of the vehicle triggering speed trap
        float speed;                    // Top speed achieved in kilometres per hour
        uint8 isOverallFastestInSession; // Overall fastest speed in session = 1, otherwise 0
        uint8 isDriverFastestInSession;  // Fastest speed for driver in session = 1, otherwise 0
        uint8 fastestVehicleIdxInSession;// Vehicle index of the vehicle that is the fastest
                                        // in this session
        float fastestSpeedInSession;     // Speed of the vehicle that is the fastest
                                         // in this session
    } SpeedTrap;

    struct
    {
        uint8 numLights;                // Number of lights showing
    } StartLIghts;

    struct
    {
        uint8 vehicleIdx;                // Vehicle index of the vehicle serving drive through
    } DriveThroughPenaltyServed;

    struct
    {
        uint8 vehicleIdx;                // Vehicle index of the vehicle serving stop go
    } StopGoPenaltyServed;

    struct
    {
        uint32 flashbackFrameIdentifier;  // Frame identifier flashed back to
        float flashbackSessionTime;       // Session time flashed back to
    } Flashback;

    struct
    {
        uint32 buttonStatus;              // Bit flags specifying which buttons are being pressed
                                          // currently - see appendices
    } Buttons;

    struct
    {
        uint8 overtakingVehicleIdx;       // Vehicle index of the vehicle overtaking
        uint8 beingOvertakenVehicleIdx;   // Vehicle index of the vehicle being overtaken
    } Overtake;

    struct
    {
        uint8 safetyCarType;              // 0 = No Safety Car, 1 = Full Safety Car
                                          // 2 = Virtual Safety Car, 3 = Formation Lap Safety Car
        uint8 eventType;                  // 0 = Deployed, 1 = Returning, 2 = Returned
                                          // 3 = Resume Race
    } SafetyCar;

    struct
    {
        uint8 vehicle1Idx;            // Vehicle index of the first vehicle involved in the collision
        uint8 vehicle2Idx;            // Vehicle index of the second vehicle involved in the collision
    } Collision;
};

struct PacketEventData
```

```
{
    PacketHeader        m_header;               // Header

    uint8               m_eventStringCode[4];   // Event string code, see below
    EventDataDetails    m_eventDetails;         // Event details - should be interpreted differently
                                                // for each type
};
```

Event String Codes

Event	Code	Description
Session Started	“SSTA”	Sent when the session starts
Session Ended	“SEND”	Sent when the session ends
Fastest Lap	“FTLP”	When a driver achieves the fastest lap
Retirement	“RTMT”	When a driver retires
DRS enabled	“DRSE”	Race control have enabled DRS
DRS disabled	“DRSD”	Race control have disabled DRS
Team mate in pits	“TMPT”	Your team mate has entered the pits
Chequered flag	“CHQF”	The chequered flag has been waved
Race Winner	“RCWN”	The race winner is announced
Penalty Issued	“PENA”	A penalty has been issued – details in event
Speed Trap Triggered	“SPTP”	Speed trap has been triggered by fastest speed
Start lights	“STLG”	Start lights – number shown
Lights out	“LGOT”	Lights out
Drive through served	“DTSV”	Drive through penalty served
Stop go served	“SGSV”	Stop go penalty served
Flashback	“FLBK”	Flashback activated
Button status	“BUTN”	Button status changed
Red Flag	“RDFL”	Red flag shown
Overtake	“OVTK”	Overtake occurred
Safety Car	“SCAR”	Safety car event – details in event
Collision	“COLL”	Collision between two vehicles has occurred

Participants Packet

This is a list of participants in the race. If the vehicle is controlled by AI, then the name will be the driver name. If this is a multiplayer game, the names will be the Steam Id on PC, or the LAN name if appropriate.

N.B. on Xbox One, the names will always be the driver name, on PS4 the name will be the LAN name if playing a LAN game, otherwise it will be the driver name.

The array should be indexed by vehicle index.

Frequency: Every 5 seconds
Size: 1350 bytes
Version: 1

```
struct ParticipantData
{
    uint8      m_aiControlled;      // Whether the vehicle is AI (1) or Human (0) controlled
    uint8      m_driverId;          // Driver id - see appendix, 255 if network human
    uint8      m_networkId;         // Network id – unique identifier for network players
    uint8      m_teamId;            // Team id - see appendix
    uint8      m_myTeam;            // My team flag – 1 = My Team, 0 = otherwise
```

```
    uint8      m_raceNumber;        // Race number of the car
    uint8      m_nationality;       // Nationality of the driver
    char       m_name[48];          // Name of participant in UTF-8 format – null terminated
                                    // Will be truncated with … (U+2026) if too long
    uint8      m_yourTelemetry;     // The player's UDP setting, 0 = restricted, 1 = public
    uint8      m_showOnlineNames;   // The player's show online names setting, 0 = off, 1 = on
    uint16     m_techLevel;         // F1 World tech level
    uint8      m_platform;          // 1 = Steam, 3 = PlayStation, 4 = Xbox, 6 = Origin, 255 = unknown
};

struct PacketParticipantsData
{
    PacketHeader    m_header;            // Header

    uint8           m_numActiveCars;     // Number of active cars in the data – should match number of
                                         // cars on HUD
    ParticipantData m_participants[22];
};
```

Car Setups Packet

This packet details the car setups for each vehicle in the session. Note that in multiplayer games, other player cars will appear as blank, you will only be able to see your own car setup, regardless of the "Your Telemetry" setting. Spectators will also not be able to see any car setups.

Frequency: 2 per second
Size: 1133 bytes
Version: 1

```
struct CarSetupData
{
    uint8     m_frontWing;               // Front wing aero
    uint8     m_rearWing;                // Rear wing aero
    uint8     m_onThrottle;              // Differential adjustment on throttle (percentage)
    uint8     m_offThrottle;             // Differential adjustment off throttle (percentage)
    float     m_frontCamber;             // Front camber angle (suspension geometry)
    float     m_rearCamber;              // Rear camber angle (suspension geometry)
    float     m_frontToe;                // Front toe angle (suspension geometry)
    float     m_rearToe;                 // Rear toe angle (suspension geometry)
    uint8     m_frontSuspension;         // Front suspension
    uint8     m_rearSuspension;          // Rear suspension
    uint8     m_frontAntiRollBar;        // Front anti-roll bar
    uint8     m_rearAntiRollBar;         // Front anti-roll bar
    uint8     m_frontSuspensionHeight;   // Front ride height
    uint8     m_rearSuspensionHeight;    // Rear ride height
    uint8     m_brakePressure;           // Brake pressure (percentage)
    uint8     m_brakeBias;               // Brake bias (percentage)
    uint8     m_engineBraking;           // Engine braking (percentage)
    float     m_rearLeftTyrePressure;    // Rear left tyre pressure (PSI)
    float     m_rearRightTyrePressure;   // Rear right tyre pressure (PSI)
    float     m_frontLeftTyrePressure;   // Front left tyre pressure (PSI)
    float     m_frontRightTyrePressure;  // Front right tyre pressure (PSI)
    uint8     m_ballast;                 // Ballast
    float     m_fuelLoad;                // Fuel load
};

struct PacketCarSetupData
{
    PacketHeader    m_header;            // Header

    CarSetupData    m_carSetups[22];

    float         m_nextFrontWingValue;  // Value of front wing after next pit stop - player only
};
```

Car Telemetry Packet

This packet details telemetry for all the cars in the race. It details various values that would be recorded on the car such as speed, throttle application, DRS etc. Note that the rev light configurations are presented separately as well and will mimic real life driver preferences.

Frequency: Rate as specified in menus
Size: 1352 bytes
Version: 1

```
struct CarTelemetryData
{
    uint16    m_speed;                    // Speed of car in kilometres per hour
    float     m_throttle;                 // Amount of throttle applied (0.0 to 1.0)
    float     m_steer;                    // Steering (-1.0 (full lock left) to 1.0 (full lock right))
    float     m_brake;                    // Amount of brake applied (0.0 to 1.0)
    uint8     m_clutch;                   // Amount of clutch applied (0 to 100)
    int8      m_gear;                     // Gear selected (1-8, N=0, R=-1)
    uint16    m_engineRPM;                // Engine RPM
    uint8     m_drs;                      // 0 = off, 1 = on
    uint8     m_revLightsPercent;         // Rev lights indicator (percentage)
    uint16    m_revLightsBitValue;        // Rev lights (bit 0 = leftmost LED, bit 14 = rightmost LED)
    uint16    m_brakesTemperature[4];     // Brakes temperature (celsius)
    uint8     m_tyresSurfaceTemperature[4]; // Tyres surface temperature (celsius)
    uint8     m_tyresInnerTemperature[4]; // Tyres inner temperature (celsius)
    uint16    m_engineTemperature;        // Engine temperature (celsius)
    float     m_tyresPressure[4];         // Tyres pressure (PSI)
    uint8     m_surfaceType[4];           // Driving surface, see appendices
};

struct PacketCarTelemetryData
{
    PacketHeader        m_header;             // Header

    CarTelemetryData    m_carTelemetryData[22];

    uint8               m_mfdPanelIndex;      // Index of MFD panel open - 255 = MFD closed
                                              // Single player, race – 0 = Car setup, 1 = Pits
                                              // 2 = Damage, 3 =  Engine, 4 = Temperatures
                                              // May vary depending on game mode
    uint8               m_mfdPanelIndexSecondaryPlayer;   // See above
    int8                m_suggestedGear;      // Suggested gear for the player (1-8)
                                              // 0 if no gear suggested
};
```

Car Status Packet

This packet details car statuses for all the cars in the race.

Frequency: Rate as specified in menus
Size: 1239 bytes
Version: 1

```
struct CarStatusData
{
    uint8       m_tractionControl;          // Traction control - 0 = off, 1 = medium, 2 = full
    uint8       m_antiLockBrakes;           // 0 (off) - 1 (on)
    uint8       m_fuelMix;                  // Fuel mix - 0 = lean, 1 = standard, 2 = rich, 3 = max
    uint8       m_frontBrakeBias;           // Front brake bias (percentage)
```

```
    uint8       m_pitLimiterStatus;         // Pit limiter status - 0 = off, 1 = on
    float       m_fuelInTank;               // Current fuel mass
    float       m_fuelCapacity;             // Fuel capacity
    float       m_fuelRemainingLaps;        // Fuel remaining in terms of laps (value on MFD)
    uint16      m_maxRPM;                   // Cars max RPM, point of rev limiter
    uint16      m_idleRPM;                  // Cars idle RPM
    uint8       m_maxGears;                 // Maximum number of gears
    uint8       m_drsAllowed;               // 0 = not allowed, 1 = allowed
    uint16      m_drsActivationDistance;    // 0 = DRS not available, non-zero - DRS will be available
                                            // in [X] metres
    uint8       m_actualTyreCompound;       // F1 Modern - 16 = C5, 17 = C4, 18 = C3, 19 = C2, 20 = C1
                                            // 21 = C0, 7 = inter, 8 = wet
                                            // F1 Classic - 9 = dry, 10 = wet
                                            // F2 – 11 = super soft, 12 = soft, 13 = medium, 14 = hard
                                            // 15 = wet
    uint8       m_visualTyreCompound;       // F1 visual (can be different from actual compound)
                                            // 16 = soft, 17 = medium, 18 = hard, 7 = inter, 8 = wet
                                            // F1 Classic – same as above
                                            // F2 ‘19, 15 = wet, 19 – super soft, 20 = soft
                                            // 21 = medium , 22 = hard
    uint8       m_tyresAgeLaps;             // Age in laps of the current set of tyres
    int8        m_vehicleFiaFlags;          // -1 = invalid/unknown, 0 = none, 1 = green
                                            // 2 = blue, 3 = yellow
    float       m_enginePowerICE;           // Engine power output of ICE (W)
    float       m_enginePowerMGUK;          // Engine power output of MGU-K (W)
    float       m_ersStoreEnergy;           // ERS energy store in Joules
    uint8       m_ersDeployMode;            // ERS deployment mode, 0 = none, 1 = medium
                                            // 2 = hotlap, 3 = overtake
    float       m_ersHarvestedThisLapMGUK;  // ERS energy harvested this lap by MGU-K
    float       m_ersHarvestedThisLapMGUH;  // ERS energy harvested this lap by MGU-H
    float       m_ersDeployedThisLap;       // ERS energy deployed this lap
    uint8       m_networkPaused;            // Whether the car is paused in a network game
};

struct PacketCarStatusData
{
    PacketHeader        m_header;           // Header

    CarStatusData       m_carStatusData[22];
};
```

Final Classification Packet

This packet details the final classification at the end of the race, and the data will match with the post race results screen. This is especially useful for multiplayer games where it is not always possible to send lap times on the final frame because of network delay.

Frequency: Once at the end of a race
Size: 1020 bytes
Version: 1

```
struct FinalClassificationData
{
    uint8     m_position;               // Finishing position
    uint8     m_numLaps;                // Number of laps completed
    uint8     m_gridPosition;           // Grid position of the car
    uint8     m_points;                 // Number of points scored
    uint8     m_numPitStops;            // Number of pit stops made
    uint8     m_resultStatus;           // Result status - 0 = invalid, 1 = inactive, 2 = active
                                        // 3 = finished, 4 = didnotfinish, 5 = disqualified
                                        // 6 = not classified, 7 = retired
    uint32    m_bestLapTimeInMS;        // Best lap time of the session in milliseconds
    double    m_totalRaceTime;          // Total race time in seconds without penalties
    uint8     m_penaltiesTime;          // Total penalties accumulated in seconds
    uint8     m_numPenalties;           // Number of penalties applied to this driver
    uint8     m_numTyreStints;          // Number of tyres stints up to maximum
```

```
    uint8     m_tyreStintsActual[8];   // Actual tyres used by this driver
    uint8     m_tyreStintsVisual[8];   // Visual tyres used by this driver
    uint8     m_tyreStintsEndLaps[8];  // The lap number stints end on
};

struct PacketFinalClassificationData
{
    PacketHeader    m_header;                    // Header

    uint8                    m_numCars;          // Number of cars in the final classification
    FinalClassificationData  m_classificationData[22];
};
```

Lobby Info Packet

This packet details the players currently in a multiplayer lobby. It details each player's selected car, any AI involved in the game and also the ready status of each of the participants.

Frequency: Two every second when in the lobby
Size: 1306 bytes
Version: 1

```
struct LobbyInfoData
{
    uint8     m_aiControlled;      // Whether the vehicle is AI (1) or Human (0) controlled
    uint8     m_teamId;            // Team id - see appendix (255 if no team currently selected)
    uint8     m_nationality;       // Nationality of the driver
    uint8     m_platform;          // 1 = Steam, 3 = PlayStation, 4 = Xbox, 6 = Origin, 255 = unknown
    char      m_name[48];          // Name of participant in UTF-8 format – null terminated
                                   // Will be truncated with ... (U+2026) if too long
    uint8     m_carNumber;         // Car number of the player
    uint8     m_yourTelemetry;     // The player's UDP setting, 0 = restricted, 1 = public
    uint8     m_showOnlineNames;   // The player's show online names setting, 0 = off, 1 = on
    uint16    m_techLevel;         // F1 World tech level
    uint8     m_readyStatus;       // 0 = not ready, 1 = ready, 2 = spectating
};

struct PacketLobbyInfoData
{
    PacketHeader    m_header;                    // Header

    // Packet specific data
    uint8               m_numPlayers;           // Number of players in the lobby data
    LobbyInfoData       m_lobbyPlayers[22];
};
```

Car Damage Packet

This packet details car damage parameters for all the cars in the race.

Frequency: 10 per second
Size: 953 bytes
Version: 1

```
struct CarDamageData
{
    float     m_tyresWear[4];                   // Tyre wear (percentage)
    uint8     m_tyresDamage[4];                 // Tyre damage (percentage)
    uint8     m_brakesDamage[4];                // Brakes damage (percentage)
    uint8     m_frontLeftWingDamage;            // Front left wing damage (percentage)
    uint8     m_frontRightWingDamage;           // Front right wing damage (percentage)
    uint8     m_rearWingDamage;                 // Rear wing damage (percentage)
    uint8     m_floorDamage;                    // Floor damage (percentage)
```

```
    uint8      m_diffuserDamage;                // Diffuser damage (percentage)
    uint8      m_sidepodDamage;                 // Sidepod damage (percentage)
    uint8      m_drsFault;                      // Indicator for DRS fault, 0 = OK, 1 = fault
    uint8      m_ersFault;                      // Indicator for ERS fault, 0 = OK, 1 = fault
    uint8      m_gearBoxDamage;                 // Gear box damage (percentage)
    uint8      m_engineDamage;                  // Engine damage (percentage)
    uint8      m_engineMGUHWear;                // Engine wear MGU-H (percentage)
    uint8      m_engineESWear;                  // Engine wear ES (percentage)
    uint8      m_engineCEWear;                  // Engine wear CE (percentage)
    uint8      m_engineICEWear;                 // Engine wear ICE (percentage)
    uint8      m_engineMGUKWear;                // Engine wear MGU-K (percentage)
    uint8      m_engineTCWear;                  // Engine wear TC (percentage)
    uint8      m_engineBlown;                   // Engine blown, 0 = OK, 1 = fault
    uint8      m_engineSeized;                  // Engine seized, 0 = OK, 1 = fault
}

struct PacketCarDamageData
{
    PacketHeader    m_header;               // Header

    CarDamageData   m_carDamageData[22];
};
```

Session History Packet

This packet contains lap times and tyre usage for the session. **This packet works slightly differently to other packets. To reduce CPU and bandwidth, each packet relates to a specific vehicle and is sent every 1/20 s, and the vehicle being sent is cycled through. Therefore in a 20 car race you should receive an update for each vehicle at least once per second.**

Note that at the end of the race, after the final classification packet has been sent, a final bulk update of all the session histories for the vehicles in that session will be sent.

Frequency: 20 per second but cycling through cars
Size: 1460 bytes
Version: 1

```
struct LapHistoryData
{
    uint32    m_lapTimeInMS;           // Lap time in milliseconds
    uint16    m_sector1TimeMSPart;        // Sector 1 milliseconds part
    uint8     m_sector1TimeMinutesPart;   // Sector 1 whole minute part
    uint16    m_sector2TimeMSPart;        // Sector 2 time milliseconds part
    uint8     m_sector2TimeMinutesPart;   // Sector 2 whole minute part
    uint16    m_sector3TimeMSPart;        // Sector 3 time milliseconds part
    uint8     m_sector3TimeMinutesPart;   // Sector 3 whole minute part
    uint8     m_lapValidBitFlags;      // 0x01 bit set-lap valid,      0x02 bit set-sector 1 valid
                                       // 0x04 bit set-sector 2 valid, 0x08 bit set-sector 3 valid
};

struct TyreStintHistoryData
{
    uint8     m_endLap;                // Lap the tyre usage ends on (255 of current tyre)
    uint8     m_tyreActualCompound;    // Actual tyres used by this driver
    uint8     m_tyreVisualCompound;    // Visual tyres used by this driver
};

struct PacketSessionHistoryData
{
    PacketHeader  m_header;                  // Header

    uint8         m_carIdx;                  // Index of the car this lap data relates to
    uint8         m_numLaps;                 // Num laps in the data (including current partial lap)
    uint8         m_numTyreStints;           // Number of tyre stints in the data

    uint8         m_bestLapTimeLapNum;       // Lap the best lap time was achieved on
```

```
    uint8         m_bestSector1LapNum;        // Lap the best Sector 1 time was achieved on
    uint8         m_bestSector2LapNum;        // Lap the best Sector 2 time was achieved on
    uint8         m_bestSector3LapNum;        // Lap the best Sector 3 time was achieved on

    LapHistoryData          m_lapHistoryData[100];       // 100 laps of data max
    TyreStintHistoryData    m_tyreStintsHistoryData[8];
};
```

Tyre Sets Packet

This packets gives a more in-depth details about tyre sets assigned to a vehicle during the session.

Frequency: 20 per second but cycling through cars
Size: 231 bytes
Version: 1

```
struct TyreSetData
{
    uint8     m_actualTyreCompound;    // Actual tyre compound used
    uint8     m_visualTyreCompound;    // Visual tyre compound used
    uint8     m_wear;                  // Tyre wear (percentage)
    uint8     m_available;             // Whether this set is currently available
    uint8     m_recommendedSession;    // Recommended session for tyre set, see appendix
    uint8     m_lifeSpan;              // Laps left in this tyre set
    uint8     m_usableLife;            // Max number of laps recommended for this compound
    int16     m_lapDeltaTime;          // Lap delta time in milliseconds compared to fitted set
    uint8     m_fitted;                // Whether the set is fitted or not
};

struct PacketTyreSetsData
{
    PacketHeader    m_header;            // Header

    uint8           m_carIdx;            // Index of the car this data relates to

    TyreSetData     m_tyreSetData[20];   // 13 (dry) + 7 (wet)

    uint8           m_fittedIdx;         // Index into array of fitted tyre
};
```

Motion Ex Packet

The motion packet gives extended data for the car being driven with the goal of being able to drive a motion platform setup.

Frequency: Rate as specified in menus
Size: 237 bytes
Version: 1

```
struct PacketMotionExData
{
    PacketHeader    m_header;                   // Header

    // Extra player car ONLY data
    float         m_suspensionPosition[4];      // Note: All wheel arrays have the following order:
    float         m_suspensionVelocity[4];      // RL, RR, FL, FR
    float         m_suspensionAcceleration[4];  // RL, RR, FL, FR
    float         m_wheelSpeed[4];              // Speed of each wheel
    float         m_wheelSlipRatio[4];          // Slip ratio for each wheel
    float         m_wheelSlipAngle[4];          // Slip angles for each wheel
    float         m_wheelLatForce[4];           // Lateral forces for each wheel
    float         m_wheelLongForce[4];          // Longitudinal forces for each wheel
    float         m_heightOfCOGAboveGround;     // Height of centre of gravity above ground
    float         m_localVelocityX;             // Velocity in local space – metres/s
    float         m_localVelocityY;             // Velocity in local space
    float         m_localVelocityZ;             // Velocity in local space
    float         m_angularVelocityX;           // Angular velocity x-component – radians/s
    float         m_angularVelocityY;           // Angular velocity y-component
    float         m_angularVelocityZ;           // Angular velocity z-component
    float         m_angularAccelerationX;       // Angular acceleration x-component – radians/s/s
    float         m_angularAccelerationY;       // Angular acceleration y-component
    float         m_angularAccelerationZ;       // Angular acceleration z-component
    float         m_frontWheelsAngle;           // Current front wheels angle in radians
    float         m_wheelVertForce[4];          // Vertical forces for each wheel
    float         m_frontAeroHeight;            // Front plank edge height above road surface
    float         m_rearAeroHeight;             // Rear plank edge height above road surface
    float         m_frontRollAngle;             // Roll angle of the front suspension
    float         m_rearRollAngle;              // Roll angle of the rear suspension
    float         m_chassisYaw;                 // Yaw angle of the chassis relative to the direction
                                                // of motion - radians
};
```

Time Trial Packet

The time trial data gives extra information only relevant to time trial game mode. This packet will not be sent in other game modes.

Frequency: 1 per second
Size: 101 bytes
Version: 1

```
struct TimeTrialDataSet
{
    uint8     m_carIdx;                 // Index of the car this data relates to
    uint8     m_teamId;                 // Team id - see appendix
    uint32    m_lapTimeInMS;            // Lap time in milliseconds
    uint32    m_sector1TimeInMS;        // Sector 1 time in milliseconds
    uint32    m_sector2TimeInMS;        // Sector 2 time in milliseconds
    uint32    m_sector3TimeInMS;        // Sector 3 time in milliseconds
    uint8     m_tractionControl;        // 0 = off, 1 = medium, 2 = full
    uint8     m_gearboxAssist;          // 1 = manual, 2 = manual & suggested gear, 3 = auto
    uint8     m_antiLockBrakes;         // 0 (off) - 1 (on)
    uint8     m_equalCarPerformance;    // 0 = Realistic, 1 = Equal
```

```
    uint8     m_customSetup;              // 0 = No, 1 = Yes
    uint8     m_valid;                    // 0 = invalid, 1 = valid
};

struct PacketTimeTrialData
{
    PacketHeader    m_header;                   // Header

    TimeTrialDataSet    m_playerSessionBestDataSet;     // Player session best data set
    TimeTrialDataSet    m_personalBestDataSet;          // Personal best data set
    TimeTrialDataSet    m_rivalDataSet;                 // Rival data set
};
```

Restricted data (Your Telemetry setting)

There is some data in the UDP that you may not want other players seeing if you are in a multiplayer game. This is controlled by the "Your Telemetry" setting in the Telemetry options. The options are:

- Restricted (Default) – other players viewing the UDP data will not see values for your car
- Public – all other players can see all the data for your car
- Show online ID – this additional option allows other players to view your online ID / gamertag in their UDP output.

Note: You can always see the data for the car you are driving regardless of the setting.

The following data items are set to zero if the player driving the car in question has their "Your Telemetry" set to "Restricted":

Car status packet

- m_fuelInTank
- m_fuelCapacity
- m_fuelMix
- m_fuelRemainingLaps
- m_frontBrakeBias
- m_ersDeployMode
- m_ersStoreEnergy
- m_ersDeployedThisLap
- m_ersHarvestedThisLapMGUK
- m_ersHarvestedThisLapMGUH
- m_enginePowerICE
- m_enginePowerMGUK

Car damage packet

- m_frontLeftWingDamage
- m_frontRightWingDamage
- m_rearWingDamage
- m_floorDamage
- m_diffuserDamage
- m_sidepodDamage
- m_engineDamage
- m_gearBoxDamage
- m_tyresWear (All four wheels)
- m_tyresDamage (All four wheels)
- m_brakesDamage (All four wheels)
- m_drsFault
- m_engineMGUHWear
- m_engineESWear
- m_engineCEWear
- m_engineICEWear

- m_engineMGUKWear
- m_engineTCWear

Tyre set packet

- All data within this packet for player car

To allow other players to view your online ID in their UDP output during an online session, you must enable the "Show online ID / gamertags" option. Selecting this will bring up a confirmation box that must be confirmed before this option is enabled.

Please note that all options can be changed during a game session and will take immediate effect.

FAQS

How do I enable the UDP Telemetry Output?

In F1 24, UDP telemetry output is controlled via the in-game menus. To enable this, enter the options menu from the main menu (triangle / Y), then enter the settings menu - the UDP option will be at the bottom of the list. From there you will be able to enable / disable the UDP output, configure the IP address and port for the receiving application, toggle broadcast mode and set the send rate. Broadcast mode transmits the data across the network subnet to allow multiple devices on the same subnet to be able to receive this information. When using broadcast mode it is not necessary to set a target IP address, just a target port for applications to listen on.

Advanced PC Users: You can additionally edit the game's configuration XML file to configure UDP output. The file is located here (after an initial boot of the game):

```
...\Documents\My Games\<game_folder>\hardwaresettings\hardware_settings_config.xml
```

You should see the tag:

```
<motion>
  ...
  <udp enabled="false" broadcast="false" ip="127.0.0.1" port="20777" sendRate="20"
format="2024" yourTelemetry="restricted" onlineNames="off" />
          ...
</motion>
```

Here you can set the values manually. Note that any changes made within the game when it is running will overwrite any changes made manually. Note the enabled flag is now a state.

What has changed since last year?

F1® 24 sees the following changes to the UDP specification:

- Adding simulation/rules options to the session packet
- Event type added to show details of safety car events
- Show online names and Your Telemetry settings added to online lobby packet
- F1 World Tech level added to lobby and participants packets
- Added minute part to car in front and leader's deltas in lap packet
- Renamed MS and Minute items to include the word part to make it clearer

- Changed formula list received in session packet
- Final Classification packets now get sent every five seconds on the results screen in case they were missed initially
- Added Time Trial packet to give more specialised information when in that game mode
- Added plank height data to the Motion Ex packet
- Added suspension roll angle to the Motion Ex packet
- Inter-car collision event added
- Weekend structure added to session packet
- Increased the size of the weather forecast array from 56 to 64 in order to accommodate new sprint weekends with more sessions
- Added speed trap details to lap packet for all cars in case any speed trap events are missed
- Added chassis yaw to Motion Ex packet to be able to work out amount of slide
- Added engine braking parameter to car setups packet
- Added track sector 2 & 3 distances to session data so marshal zone matching is easier
- Added front wing value at next pit stop to car setup for players

What is the order of the wheel arrays?

All wheel arrays are in the following order:

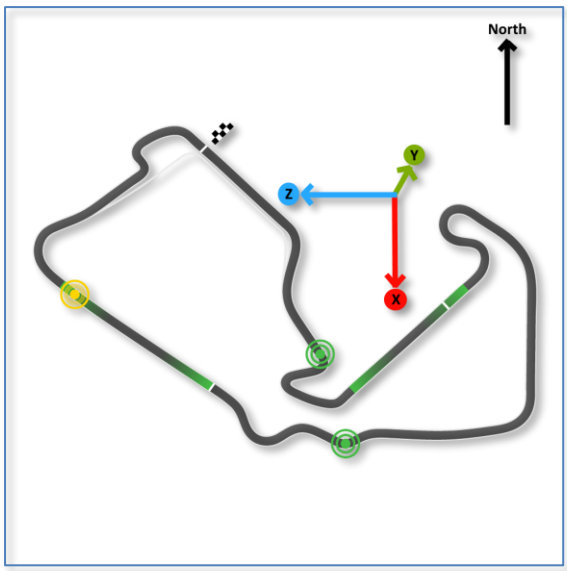
```
0 - Rear Left (RL)
1 - Rear Right (RR)
2 - Front Left (FL)
3 - Front Right (FR)
```

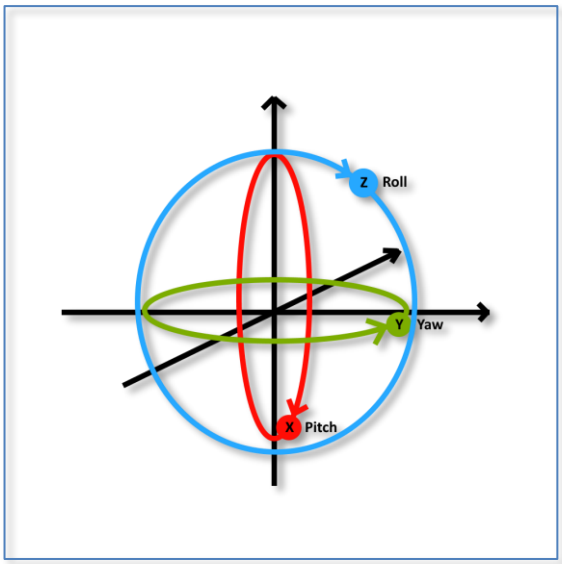
Do the vehicle indices change?

During a session, each car is assigned a vehicle index. This will not change throughout the session and all the arrays that are sent use this vehicle index to dereference the correct piece of data.

What are the co-ordinate systems used?

Here is a visual representation of the co-ordinate system used with the F1 telemetry data.





What encoding format is used?

All values are encoded using Little Endian format.

Are the data structures packed?

Yes, all data is packed, there is no padding used.

How many cars are in the data structures?

The maximum number of cars in the data structures is 22, to allow for certain game modes, although the data is not always filled in.

You should always check the data item called `m_numActiveCars` in the participants packet which tells you how many cars are active in the race. However, you should check the individual result status of each car in the lap data to see if that car is actively providing data. If it is not "`Invalid`" or "`Inactive`" then the corresponding vehicle index has valid data.

How often are updated packets sent?

For the packets which get updated at "Rate as specified in the menus" you can be guaranteed that on the frame that these get sent they will all get sent together and will never be separated across frames. This of course relies on the reliability of your network as to whether they are received correctly as everything is sent via UDP. Other packets that get sent at specific rates can arrive on any frame.

If you are connected to the game when it starts transmitting the first frame will contain the following information to help initialise data structures on the receiving application:

Packets sent on Frame 1: (All packets sent on this frame have "Session timestamp" 0.000)

- Session
- Participants
- Car Setups
- Lap Data
- Motion Data
- Car Telemetry
- Car Status
- Car Damage
- Motion Ex Data

As an example, assuming that you are running at 60Hz with 60Hz update rate selected in the menus then you would expect to see the following packets and timestamps:

Packets sent on Frame 2: (All packets sent on this frame have "Session timestamp" 0.016)

- Lap Data
- Motion Data
- Car Telemetry
- Car Status

- Motion Ex Data

...

Packets sent on Frame 31: (All packets sent on this frame have "Session timestamp" 0.5)

- Session (since 2 updates per second)
- Car Setups (since 2 updates per second)
- Lap Data
- Motion Data
- Car Telemetry
- Car Status
- Car Damage (since 2 updates per second)
- Motion Ex Data

Will my old app still work with F1 24?

Please note that F1 24 will only support the previous 2 UDP formats.

F1 24 uses a new format for the UDP data. However, some earlier formats of the data are still supported so that most older apps implemented using the previous data formats should work with little or no change from the developer. To use the old formats, please enter the UDP options menu and set "UDP Format" to either "2023" or "2022".
Specifications for the older formats can be seen here:

- F1 22 - https://answers.ea.com/t5/General-Discussion/F1-22-UDP-Specification/td-p/11551274
- F1 23 - https://answers.ea.com/t5/General-Discussion/F1-23-UDP-Specification/m-p/12633159

How do I enable D-BOX output?

D-BOX output is currently supported on the PC platform. In F1 24, the D-BOX activation can be controlled via the menus. Navigate to `Game Options->Settings->UDP Telemetry Settings->D-BOX` to activate this on your system.

Advanced PC Users: It is possible to control D-BOX by editing the games' configuration XML file. The file is located here (after an initial boot of the game):

```
...\Documents\My Games\<game_folder>\hardwaresettings\hardware_settings_config.xml
```

You should see the tag:

```
<motion>
  <dbox enabled="false" />
  ...
</motion>
```

Set the "`enabled`" value to "`true`" to allow the game to output to your D-BOX motion platform. Note that any changes made within the game when it is running will overwrite any changes made manually.

How can I disable in-game support for LED device?

The F1 game has native support for some of the basic features supported by some external LED devices, such as the *Leo Bodnar SLI Pro* and the *Fanatec* steering wheels. To avoid conflicts between

the game's implementation and any third-party device managers on the PC platform it may be necessary to disable the native support. This is done using the following `led_display` flags in the `hardware_settings_config.xml`. The file is located here (after an initial boot of the game):

```
...\Documents\My Games\<game_folder>\hardwaresettings\hardware_settings_config.xml
```

The flags to enabled/disable LED output are:

```
<led_display fanatecNativeSupport="true" sliProNativeSupport="true" />
```

The `sliProNativeSupport` flag controls the output to SLI Pro devices. The `fanatecNativeSupport` flag controls the output to Fanatec (and some related) steering wheel LEDs. Set the values for any of these to `"false"` to disable them and avoid conflicts with your own device manager.

Please note there is an additional flag to manually control the LED brightness on the SLI Pro:

```
<led_display sliProForceBrightness="127" />
```

This option (using value in the range 0-255) will be ignored when setting the `sliProNativeSupport` flag to `"false"`.

Also note it is now possible to edit these values on the fly via the `Game Options->Settings->UDP Telemetry Settings` menu.

Can I configure the UDP output using an XML File?

PC users can edit the game's configuration XML file to configure UDP output. The file is located here (after an initial boot of the game):

```
...\Documents\My Games\<game_folder>\hardwaresettings\hardware_settings_config.xml
```

You should see the tag:

```
   <motion>
     ...
     <udp enabled="false" broadcast="false" ip="127.0.0.1" port="20777" sendRate="20"
format="2024" yourTelemetry="restricted" onlineNames="off" />
     ...
   </motion>
```

Here you can set the values manually. Note that any changes made within the game when it is running will overwrite any changes made manually.

Appendices

Here are the values used for some of the parameters in the UDP data output.

Team IDs

ID	Team
0	Mercedes
1	Ferrari
2	Red Bull Racing
3	Williams
4	Aston Martin
5	Alpine
6	RB
7	Haas
8	McLaren
9	Sauber
41	F1 Generic
104	F1 Custom Team
143	Art GP ‘23
144	Campos ‘23
145	Carlin ‘23
146	PHM ‘23
147	Dams ‘23
148	Hitech ‘23
149	MP Motorsport ‘23
150	Prema ‘23
151	Trident ‘23
152	Van Amersfoort Racing ‘23
153	Virtuosi ‘23

Driver IDs

ID	Driver	ID	Driver	ID	Driver
0	Carlos Sainz	56	Louis Delétraz	115	Theo Pourchaire
1	Daniil Kvyat	57	Antonio Fuoco	116	Richard Verschoor
2	Daniel Ricciardo	58	Charles Leclerc	117	Lirim Zendeli
3	Fernando Alonso	59	Pierre Gasly	118	David Beckmann
4	Felipe Massa	62	Alexander Albon	121	Alessio Deledda
6	Kimi Räikkönen	63	Nicholas Latifi	122	Bent Viscaal
7	Lewis Hamilton	64	Dorian Boccolacci	123	Enzo Fittipaldi
9	Max Verstappen	65	Niko Kari	125	Mark Webber
10	Nico Hulkenburg	66	Roberto Merhi	126	Jacques Villeneuve
11	Kevin Magnussen	67	Arjun Maini	127	Callie Mayer
12	Romain Grosjean	68	Alessio Lorandi	128	Noah Bell
13	Sebastian Vettel	69	Ruben Meijer	129	Jake Hughes
14	Sergio Perez	70	Rashid Nair	130	Frederik Vesti
15	Valtteri Bottas	71	Jack Tremblay	131	Olli Caldwell
17	Esteban Ocon	72	Devon Butler	132	Logan Sargeant
19	Lance Stroll	73	Lukas Weber	133	Cem Bolukbasi
20	Arron Barnes	74	Antonio Giovinazzi	134	Ayumu Iwasa
21	Martin Giles	75	Robert Kubica	135	Clement Novalak
22	Alex Murray	76	Alain Prost	136	Jack Doohan
23	Lucas Roth	77	Ayrton Senna	137	Amaury Cordeel
24	Igor Correia	78	Nobuharu Matsushita	138	Dennis Hauger
25	Sophie Levasseur	79	Nikita Mazepin	139	Calan Williams
26	Jonas Schiffer	80	Guanya Zhou	140	Jamie Chadwick
27	Alain Forest	81	Mick Schumacher	141	Kamui Kobayashi
28	Jay Letourneau	82	Callum Ilott	142	Pastor Maldonado
29	Esto Saari	83	Juan Manuel Correa	143	Mika Hakkinen
30	Yasar Atiyeh	84	Jordan King	144	Nigel Mansell
31	Callisto Calabresi	85	Mahaveer Raghunathan	145	Zane Maloney
32	Naota Izum	86	Tatiana Calderon	146	Victor Martins
33	Howard Clarke	87	Anthoine Hubert	147	Oliver Bearman
34	Wilheim Kaufmann	88	Guiliano Alesi	148	Jak Crawford
35	Marie Laursen	89	Ralph Boschung	149	Isack Hadjar
36	Flavio Nieves	90	Michael Schumacher	150	Arthur Leclerc
37	Peter Belousov	91	Dan Ticktum	151	Brad Benavides
38	Klimek Michalski	92	Marcus Armstrong	152	Roman Stanek
39	Santiago Moreno	93	Christian Lundgaard	153	Kush Maini
40	Benjamin Coppens	94	Yuki Tsunoda	154	James Hunt
41	Noah Visser	95	Jehan Daruvala	155	Juan Pablo Montoya
42	Gert Waldmuller	96	Gulherme Samaia	156	Brendon Leigh
43	Julian Quesada	97	Pedro Piquet	157	David Tonizza
44	Daniel Jones	98	Felipe Drugovich	158	Jarno Opmeer
45	Artem Markelov	99	Robert Schwartzman	159	Lucas Blakeley
46	Tadasuke Makino	100	Roy Nissany		

47	Sean Gelael	101	Marino Sato		
48	Nyck De Vries	102	Aidan Jackson		
49	Jack Aitken	103	Casper Akkerman		
50	George Russell	109	Jenson Button		
51	Maximilian Günther	110	David Coulthard		
52	Nirei Fukuzumi	111	Nico Rosberg		
53	Luca Ghiotto	112	Oscar Piastri		
54	Lando Norris	113	Liam Lawson		
55	Sérgio Sette Câmara	114	Juri Vips		

Track IDs

ID	Track
0	Melbourne
1	Paul Ricard
2	Shanghai
3	Sakhir (Bahrain)
4	Catalunya
5	Monaco
6	Montreal
7	Silverstone
8	Hockenheim
9	Hungaroring
10	Spa
11	Monza
12	Singapore
13	Suzuka
14	Abu Dhabi
15	Texas
16	Brazil
17	Austria
18	Sochi
19	Mexico
20	Baku (Azerbaijan)
21	Sakhir Short
22	Silverstone Short
23	Texas Short
24	Suzuka Short
25	Hanoi
26	Zandvoort
27	Imola
28	Portimão
29	Jeddah
30	Miami
31	Las Vegas
32	Losail

Nationality IDs

ID	Nationality	ID	Nationality	ID	Nationality
1	American	31	Greek	61	Paraguayan
2	Argentinean	32	Guatemalan	62	Peruvian
3	Australian	33	Honduran	63	Polish
4	Austrian	34	Hong Konger	64	Portuguese
5	Azerbaijani	35	Hungarian	65	Qatari
6	Bahraini	36	Icelander	66	Romanian
7	Belgian	37	Indian	68	Salvadoran
8	Bolivian	38	Indonesian	69	Saudi
9	Brazilian	39	Irish	70	Scottish
10	British	40	Israeli	71	Serbian
11	Bulgarian	41	Italian	72	Singaporean
12	Cameroonian	42	Jamaican	73	Slovakian
13	Canadian	43	Japanese	74	Slovenian
14	Chilean	44	Jordanian	75	South Korean
15	Chinese	45	Kuwaiti	76	South African
16	Colombian	46	Latvian	77	Spanish
17	Costa Rican	47	Lebanese	78	Swedish
18	Croatian	48	Lithuanian	79	Swiss
19	Cypriot	49	Luxembourger	80	Thai
20	Czech	50	Malaysian	81	Turkish
21	Danish	51	Maltese	82	Uruguayan
22	Dutch	52	Mexican	83	Ukrainian
23	Ecuadorian	53	Monegasque	84	Venezuelan
24	English	54	New Zealander	85	Barbadian
25	Emirian	55	Nicaraguan	86	Welsh
26	Estonian	56	Northern Irish	87	Vietnamese
27	Finnish	57	Norwegian	88	Algerian
28	French	58	Omani	89	Bosnian
29	German	59	Pakistani	90	Filipino
30	Ghanaian	60	Panamanian		

Game Mode IDs

ID	Mode
0	Event Mode
3	Grand Prix
4	Grand Prix ‘23
5	Time Trial
6	Splitscreen
7	Online Custom
8	Online League
11	Career Invitational
12	Championship Invitational
13	Championship
14	Online Championship
15	Online Weekly Event
17	Story Mode
19	Career ‘22
20	Career ‘22 Online
21	Career ‘23
22	Career ‘23 Online
23	Driver Career ‘24
24	Career ‘24 Online
25	My Team Career ‘24
26	Curated Career ‘24
127	Benchmark

Session types

ID	Session type
0	Unknown
1	Practice 1
2	Practice 2
3	Practice 3
4	Short Practice
5	Qualifying 1
6	Qualifying 2
7	Qualifying 3
8	Short Qualifying
9	One-Shot Qualifying
10	Sprint Shootout 1
11	Sprint Shootout 2
12	Sprint Shootout 3
13	Short Sprint Shootout
14	One-Shot Sprint Shootout

15	Race
16	Race 2
17	Race 3
18	Time Trial

Ruleset IDs

ID	Ruleset
0	Practice & Qualifying
1	Race
2	Time Trial
4	Time Attack
6	Checkpoint Challenge
8	Autocross
9	Drift
10	Average Speed Zone
11	Rival Duel

Surface types

These types are from physics data and show what type of contact each wheel is experiencing.

ID	Surface
0	Tarmac
1	Rumble strip
2	Concrete
3	Rock
4	Gravel
5	Mud
6	Sand
7	Grass
8	Water
9	Cobblestone
10	Metal
11	Ridged

Button flags

These flags are used in the telemetry packet to determine if any buttons are being held on the controlling device. If the value below logical ANDed with the button status is set then the corresponding button is being held.

Bit Flag	Button
0x00000001	Cross or A
0x00000002	Triangle or Y

0x00000004	Circle or B
0x00000008	Square or X
0x00000010	D-pad Left
0x00000020	D-pad Right
0x00000040	D-pad Up
0x00000080	D-pad Down
0x00000100	Options or Menu
0x00000200	L1 or LB
0x00000400	R1 or RB
0x00000800	L2 or LT
0x00001000	R2 or RT
0x00002000	Left Stick Click
0x00004000	Right Stick Click
0x00008000	Right Stick Left
0x00010000	Right Stick Right
0x00020000	Right Stick Up
0x00040000	Right Stick Down
0x00080000	Special
0x00100000	UDP Action 1
0x00200000	UDP Action 2
0x00400000	UDP Action 3
0x00800000	UDP Action 4
0x01000000	UDP Action 5
0x02000000	UDP Action 6
0x04000000	UDP Action 7
0x08000000	UDP Action 8
0x10000000	UDP Action 9
0x20000000	UDP Action 10
0x40000000	UDP Action 11
0x80000000	UDP Action 12

Penalty types

ID	Penalty meaning
0	Drive through
1	Stop Go
2	Grid penalty
3	Penalty reminder
4	Time penalty
5	Warning
6	Disqualified
7	Removed from formation lap
8	Parked too long timer
9	Tyre regulations

10	This lap invalidated
11	This and next lap invalidated
12	This lap invalidated without reason
13	This and next lap invalidated without reason
14	This and previous lap invalidated
15	This and previous lap invalidated without reason
16	Retired
17	Black flag timer

Infringement types

ID	Infringement meaning
0	Blocking by slow driving
1	Blocking by wrong way driving
2	Reversing off the start line
3	Big Collision
4	Small Collision
5	Collision failed to hand back position single
6	Collision failed to hand back position multiple
7	Corner cutting gained time
8	Corner cutting overtake single
9	Corner cutting overtake multiple
10	Crossed pit exit lane
11	Ignoring blue flags
12	Ignoring yellow flags
13	Ignoring drive through
14	Too many drive throughs
15	Drive through reminder serve within n laps
16	Drive through reminder serve this lap
17	Pit lane speeding
18	Parked for too long
19	Ignoring tyre regulations
20	Too many penalties
21	Multiple warnings
22	Approaching disqualification
23	Tyre regulations select single
24	Tyre regulations select multiple
25	Lap invalidated corner cutting
26	Lap invalidated running wide
27	Corner cutting ran wide gained time minor
28	Corner cutting ran wide gained time significant
29	Corner cutting ran wide gained time extreme
30	Lap invalidated wall riding

31	Lap invalidated flashback used
32	Lap invalidated reset to track
33	Blocking the pitlane
34	Jump start
35	Safety car to car collision
36	Safety car illegal overtake
37	Safety car exceeding allowed pace
38	Virtual safety car exceeding allowed pace
39	Formation lap below allowed speed
40	Formation lap parking
41	Retired mechanical failure
42	Retired terminally damaged
43	Safety car falling too far back
44	Black flag timer
45	Unserved stop go penalty
46	Unserved drive through penalty
47	Engine component change
48	Gearbox change
49	Parc Fermé change
50	League grid penalty
51	Retry penalty
52	Illegal time gain
53	Mandatory pitstop
54	Attribute assigned

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