

Mixed Team Package for Inter-Team Robot-Robot Communication (v. 2)

This standard was adopted during the fourth edition of the International RoboCup MSL Workshop which took place in Eindhoven on the 10th, 11th and 12th of November, 2014.

Please direct questions and suggestions to the MSL Exec and TC Committees.

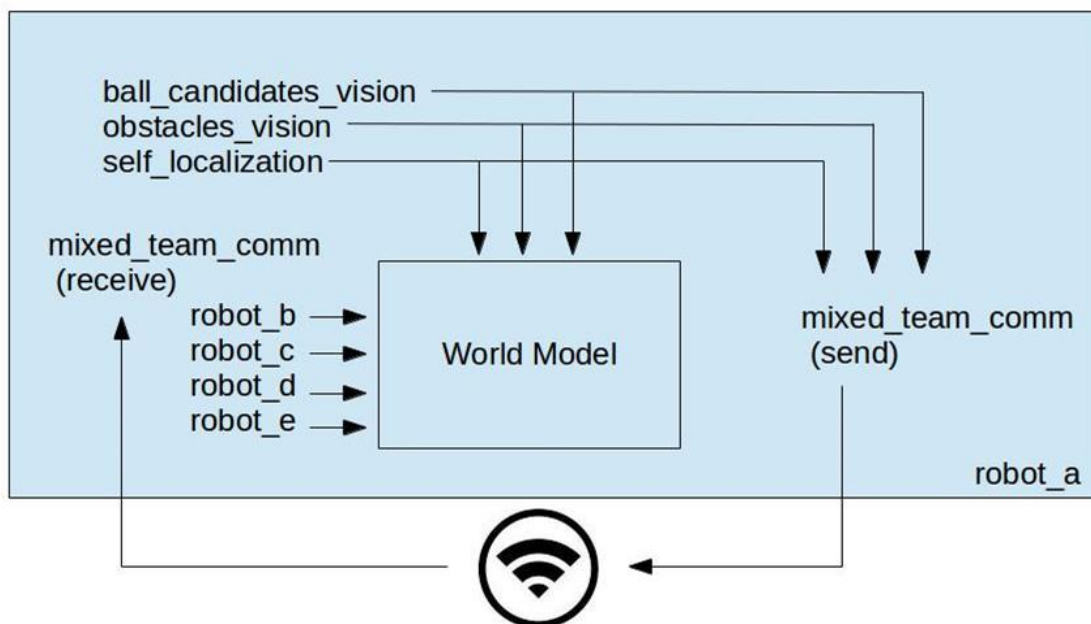
http://wiki.robocup.org/wiki/Middle_Size_League

Objective

Standardizing robot-robot interfaces in MSL facilitates knowledge sharing among robots who have a different software architecture and different worldmodel implementations. By doing this we ease mixed-team challenges, make sharing of code among teams more easy and we contribute to research on robot-robot communication beyond RoboCup MSL.

Worldmodel

By worldmodel we mean the piece of software where perceived obstacles, ball, and self-localisation of the robot and its peers are merged into a single, stable, representation of the state of the world. So schematically, for robot_a working with b, c, d and e in a mixed team:



Network Setup

A router configured as MSL_FIELD_A or MSL_FIELD_B provides the network. See the [MSL rulebook](#) (page 81) for details with respect to configuration of this router.

Mixed team packages have to be send as UDP packages, via address and port:

224.16.32.75:2005

Additional, non-mixed-team communication can be send through the same channel but mixed_team_flag in the description below should not equal the identifier for a mixed team package.

Mixed Team Package General Remarks

- Robots participating in a mixed team can either prepend their existing packages with the data structure below, or send the data structure below separately. So make sure to explicitly check for the mixed team flag instead of the package size before a package is considered valid in your software.
- Before sending packages, make sure the data structure is aligned.
- Distances and velocities are in millimeters or millimeter per second respectively, to prevent the need of floats instead of ints.
- Where relevant we use a little-endian sequence of bytes.
- No standard is prescribed with respect to rate at which the mixed team package is communicated. Most teams are able to deliver somewhere in the range of 10-30 Hz.
- Confidence scores range from 1 to 255 in UINT8, in case a confidence is not known, use UINT8 MIN
- Use INT16 MIN to indicate a coordinate or velocity field is not used, that is -32768 or 0x8000 in hexadecimal. This is relevant for instance if less than three ball candidates are known, less than twelve obstacles are known, or in case self-loc cannot be determined.
- All coordinates are in a global frame, specified in the standardized WM logging document: http://wiki.robocup.org/wiki/Middle_Size_League#Standardized_Logging

Mixed Team Package Specification

| mixed_team_flag (1 byte) | package_version (1 byte) | timestamp (4 bytes) | team_color (1 byte) | original_team_id (1 byte) | mixed_team_robot_id (1 byte) | ball_cand_vision (39 bytes) | obstacles (108 bytes) | self-loc (13 bytes) |

- **mixed_team_flag** is 123 in UINT8
- **package_version** is equal to the number in the title and filename of this document in UINT8
- **timestamp** is equal to the time in milliseconds since the start of half signal has been received

from the refbox, in UINT32

- **team_color** is equal to 1 in case the robot is in the Magenta team, 0 in case it is playing for the Cyan team, in UINT8
- **original_team_id** is equal to the last two numbers of the multicast address reserved for the team the robot is coming from, in UINT8. See page 82 of the [MSL rulebook](#)
- **mixed_team_robot_id** corresponds to the jersey number of the robot (1-6) in UINT8
- **ball_cand_vision** contains up to three ball candidates. Each ball candidate is stored in 6 INT16 fields, followed by one UINT8. This represents a sequence of $xyz\dot{x}\dot{y}\dot{z}$ followed by a confidence score.
- **obstacles** contains a list of up to 12 obstacles. Each obstacle is stored in four INT16 fields followed by one UINT8. This represent a sequence of $xy\dot{x}\dot{y}$ followed by a confidence score.
- **self-loc** is stored in six INT16 fields followed by one UINT8. These fields represent a sequence of $xy\theta\dot{x}\dot{y}\dot{\theta}$

Total size of the mixed team package is 169 bytes.