



Eadon Spawner

Version 2.1

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Introduction

Eadon Spawner is a sophisticated, high performance runtime spawning system with the following features:

- Pooling of spawnable objects
- Spawning in background via Coroutines
- Support for network spawning (using Mirror, Fish-Net and Unity Netcode for GameObjects))
- Network synchronization of spawn pools
- Support for time of day (via Enviro), with day and night spawn lists
- Support for spawning only on selected textures (for terrain spawning)
- Support for spawning only on selected materials (for mesh spawning)
- Support for spawning NPC AIs
 - Automatic despawning on death
 - Automatic AI reset on respawning

The supported AI systems are:

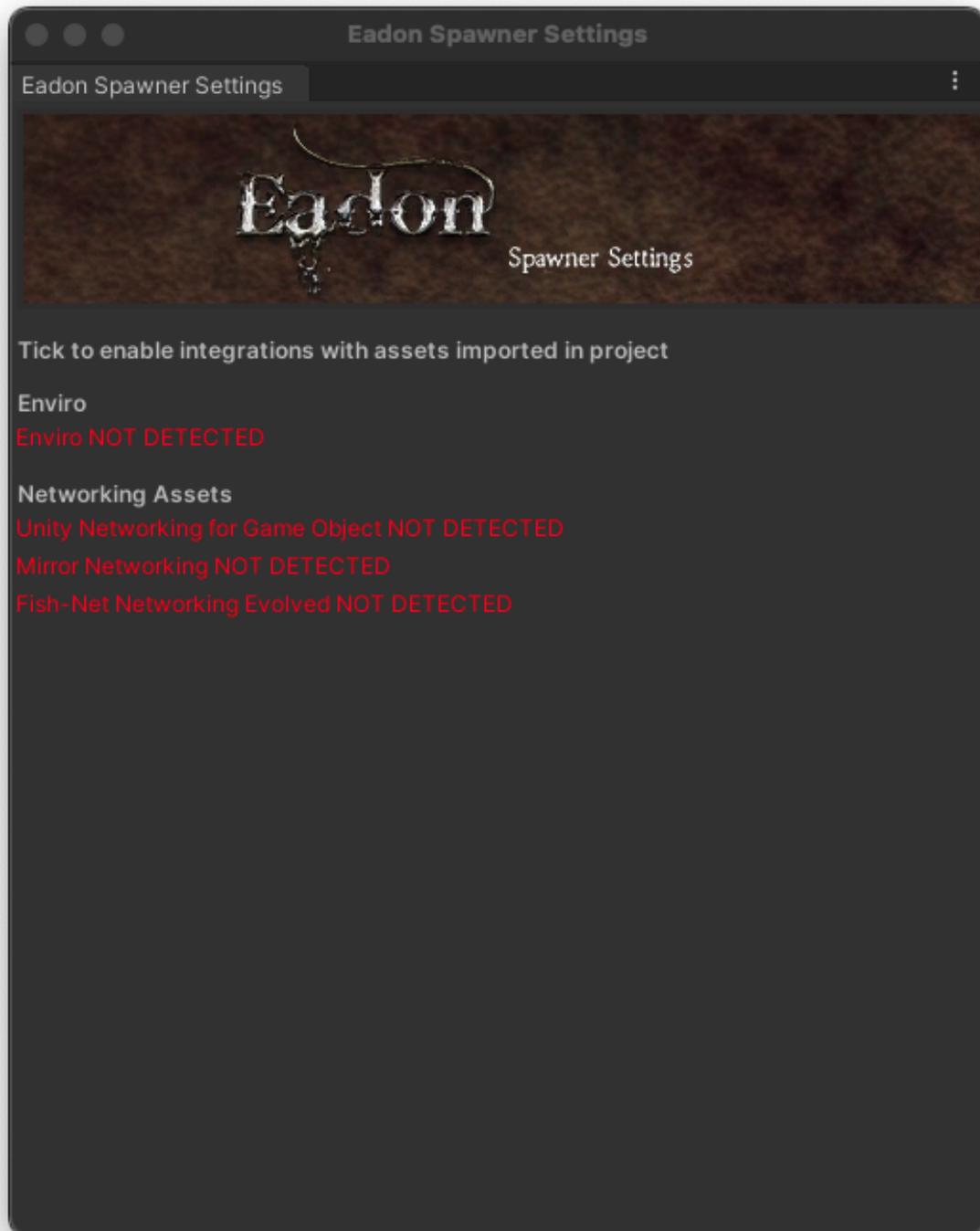
- Invector FSM AI (version 1.1.9 or higher)
- Emerald AI 3.0 (version 3.2 or higher)
- Emerald AI 2024 (version 1.1.2 or higher)
- Eadon AI (version 2.0 and higher)

Changelog

V 1.0	Initial release
V 1.1	Fixed a bug related to detection of players inside a spawn area Fixed an issue preventing spawn areas to move correctly once created (in editor or with origin shift) Improved spawning of server side NPCs
V2.0	Improved support for Mirror Support for Unity Netcode for GameObjects Support for Fish-Net Support for Emerald AI 2024 Bug fixes
V2.1	Bug fixes

Installation

After importing Eadon Spawner, you can use the Eadon/Spawner Settings menu to activate support for third party assets and import the relative demo scenes:



Please note that Invector FSM AI, Emerald AI 3.0, Emerald AI 2024 and Eadon AI are detected automatically.

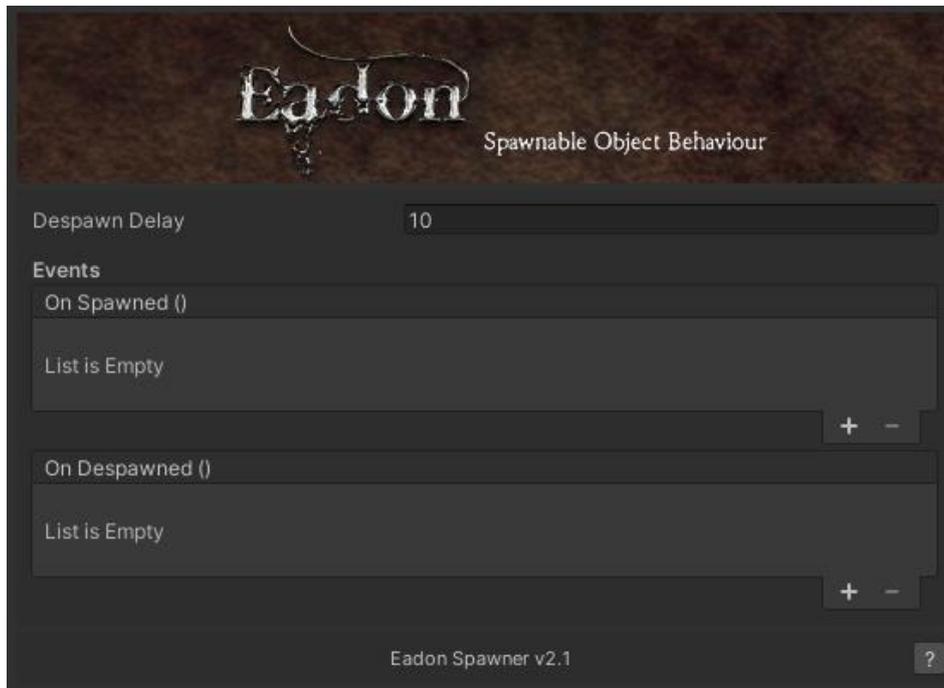
Configuration

The configuration of a spawnable object is a two step process:

- The object needs a **SpawnableObjectBehaviour** component attached
- A **SpawnableObject** needs to be created

SpawnableObjectBehaviour

Every object that can be spawned by Eadon Spawner needs to have a **SpawnableObjectBehaviour** component attached to the main game object:



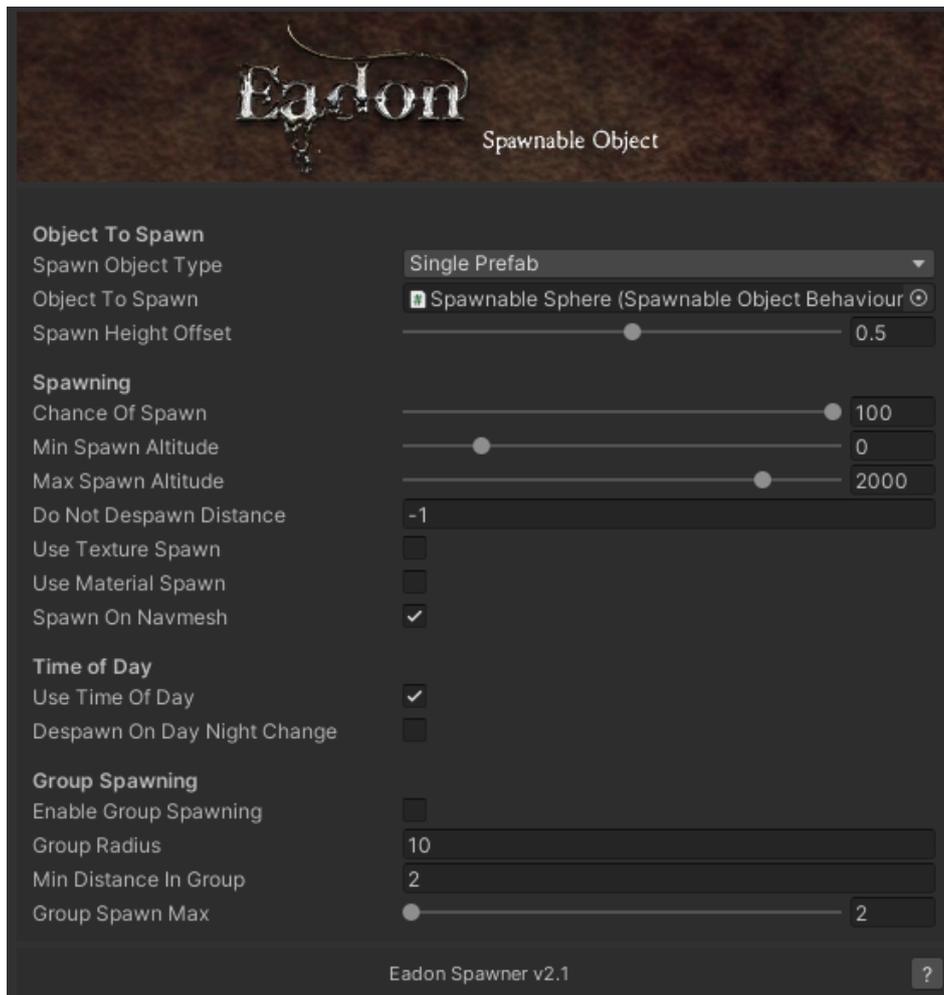
This component exposes two events, triggered when the object is spawned and despawned. There are other specialized components with support for AI spawning:

Component	Requirement
EmeraldAiSpawnableObjectBehaviour	Emerald AI
MirrorEmeraldAiSpawnableObjectBehaviour	Emerald AI and Eadon Emerald Mirror
FsmAiSpawnableObjectBehaviour	Invector FSM AI
MirrorFsmAiSpawnableObjectBehaviour	Invector FSM AI and Eadon Invector Mirror

These specialised components automatically despawn NPC Ais on death (see below for details).

SpawnableObject

In order to spawn something, a **SpawnableObject** needs to be created. This is a **ScriptableObject** which contains all the information needed to spawn:



The fields are as follows:

Field	Role
Spawn Object Type	Choice of Single Prefab or Random From List
Object To Spawn	The prefab to spawn (needs to have a SpawnableObjectBehaviour). Visible if Spawn Object Type is Single Object
Objectss To Spawn	The list of prefabs to choose from to spawn (needs to have a SpawnableObjectBehaviour). Visible if Spawn Object Type is Random From List
Spawn Height Offset	An optional offset from the ground at which to spawn the object
Chance of Spawn	The chance of the object spawning
Min Spawn Altitude	The minimum spawn altitude
Max Spawn Altitude	The maximum spawn altitude
Do Not Despawn Distance	The distance from the player below which the object will not be despawned
Use Texture Spawn	A flag to indicate whether to use textures to constrain spawning

Target Textures	A list of textures to use for spawning, only visible if Use Texture Spawn is selected
Use Material Spawn	A flag to indicate whether to use materials to constrain spawning
Target Materials	A list of Materials to use for spawning, only visible if Use Material Spawn is selected
Spawn On Navmesh	A flag to indicate if the spawn position needs to be a valid navmesh location
Use Time Of Day	A toggle to enable use of time of day, only present if Enviro is installed
Despawn on Day Night Change	A toggle to enable automatic despawning on day/night change if the prefab is on a day or night spawn list, only present if Enviro is installed and Use Time of Day is enabled
Enable Group Spawning	A flag to enable spawning the object in groups
Group Radius	The radius of the area in which the group members will spawn
Min Distance In Group	The minimum distance between group members
Group Spawn Max	The max size of the group

In order to create a **SpawnableObject**, you need to right click in you project and select **Create/Eadon/Spawner/New Spawnable Object** from the popup menu.

Group spawning happens as a best effort. At least one will spawn, but there might not be enough spawn positions for a given group size and radius. Also, it might be that there are not enough entities in the pool to reach the group size.

The Random From List option allows you to create, for example, a Spawnable Object for merchant tent with a choice of different tents.

Spawning

In order to spawn, you need two things in your scene: an **EadonSpawnManager** object and one or more **EadonSpawnPoint** or **EadonSpawnArea**.

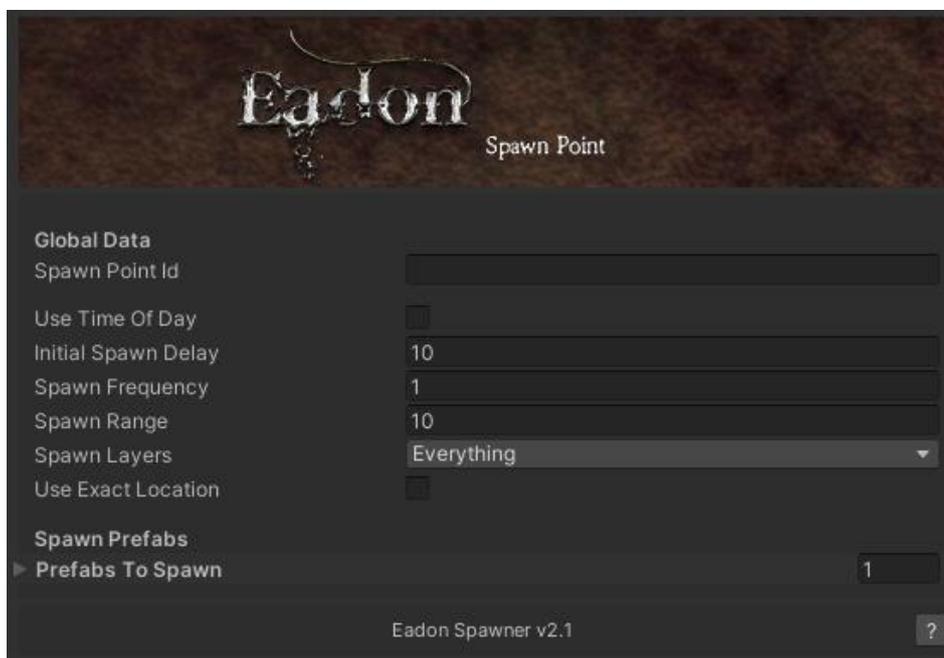
Periodically, the spawn manager will check for spawns. The interval is determined by the spawn point (or area) initial spawn delay (for the initial spawn) or the spawn frequency (for spawns after the initial one).

Spawning happens if the player is within the spawn range of the spawn point. The spawn range is measured from the position in case of a spawn point or as the distance from each point in the border of a spawn area. Conversely, despawning happens when the player is outside the spawn range.

Spawnable objects have a do not despawn range to make sure that roaming NPCs chasing the player do not suddenly despawn if the player goes beyond the spawn range. This can be disabled by setting the do not despawn distance to a negative value.

Spawn Points

Spawn points are locations in your scene around which objects can be spawned. To create a spawn point, create an empty game object at the position you want and attach the **EadonSpawnPoint** script:

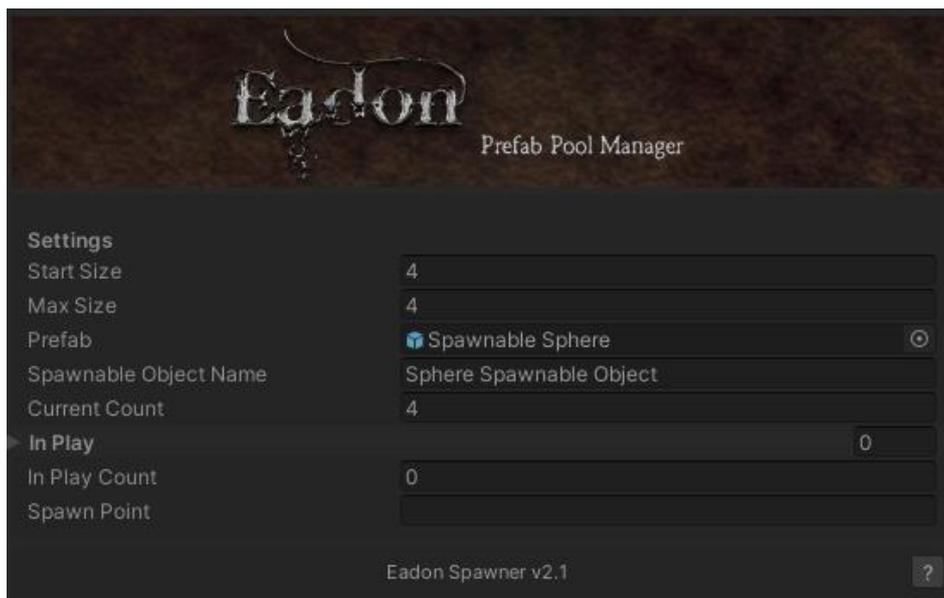


The fields are:

Field	Role
Spawn Point Id	A unique identifier for the spawn point, used for network spawning (see the chapter on network spawning), can be left blank if not networked
Use Time Of Day	If enabled, two lists of spawnable appear (day and night). Only available if Enviro is installed

Initial Spawn Delay	How long after scene start should the spawn point start spawning
Spawn Frequency	How long after the initial spawn should the spawn point check for new spawns
Spawn Range	The range around the spawn point in which spawning happen
Spawn Layers	The layers on which spawning can happen
Prefabs to Spawn	The list of spawn object, and the corresponding population cap
Prefabs to Spawn Day	The list of spawn objects, and the corresponding population cap, to spawn during the day. Only available if Enviro is installed
Prefabs to Spawn Night	The list of spawn objects, and the corresponding population cap, to spawn during the night. Only available if Enviro is installed

At start, the spawn point will create a pool for each of the spawnable objects, with a size equal to the population limit set for the object. This population limit is the maximum number of the object that can be in play at the same time. Every time a new object needs to be spawned, it's taken from the pool, and when the object is despawned, it will be placed back into the pool.



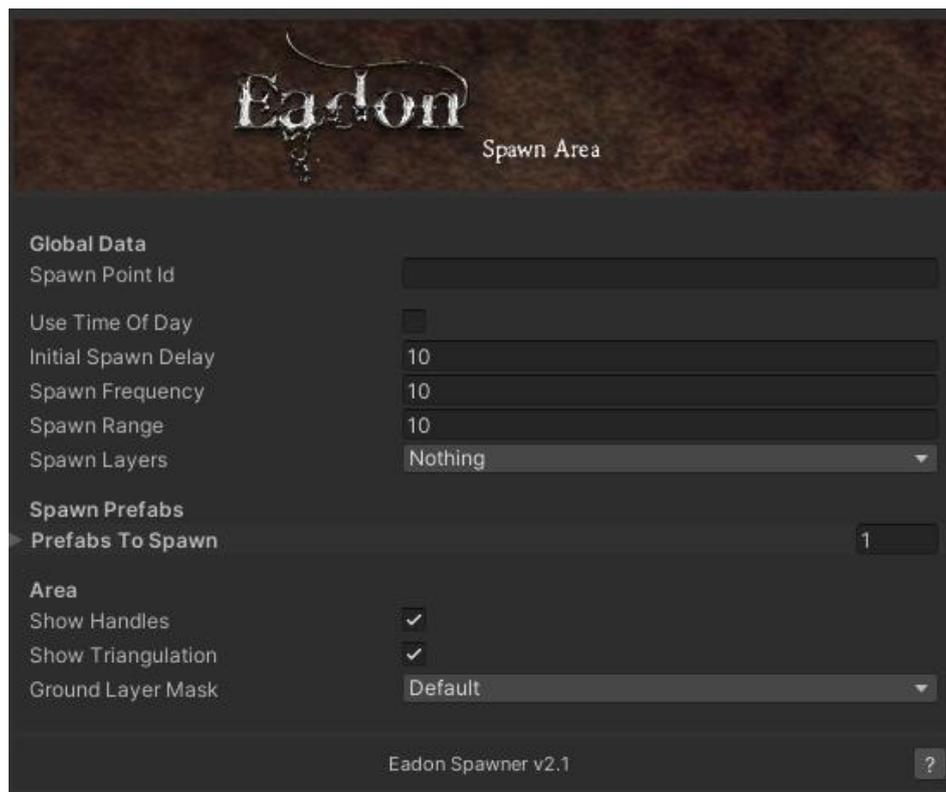
As this is a runtime created component, the data shown is for information purpose. The fields are:

Field	Role
Start Size	The start size of the pool, by default the population limit

Max Size	The max size of the pool, by default the population limit
Prefab	The prefab to spawn
Current Count	The current count of pool members
In Play	A list of all the spawned game objects
In Play Count	The number of in play spawned game objects

Spawn Area

Spawn areas allow spawning within a predefined area. To create a spawn area, create an empty game object at the position you want and attach the **EadonSpawnArea** script:

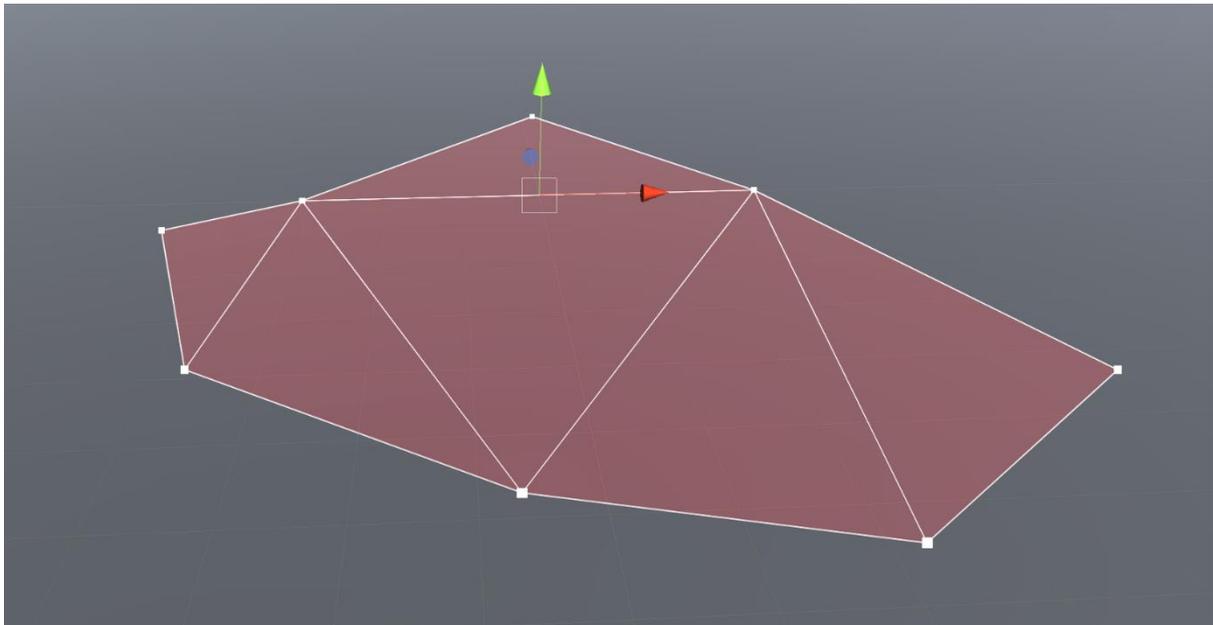


The fields are:

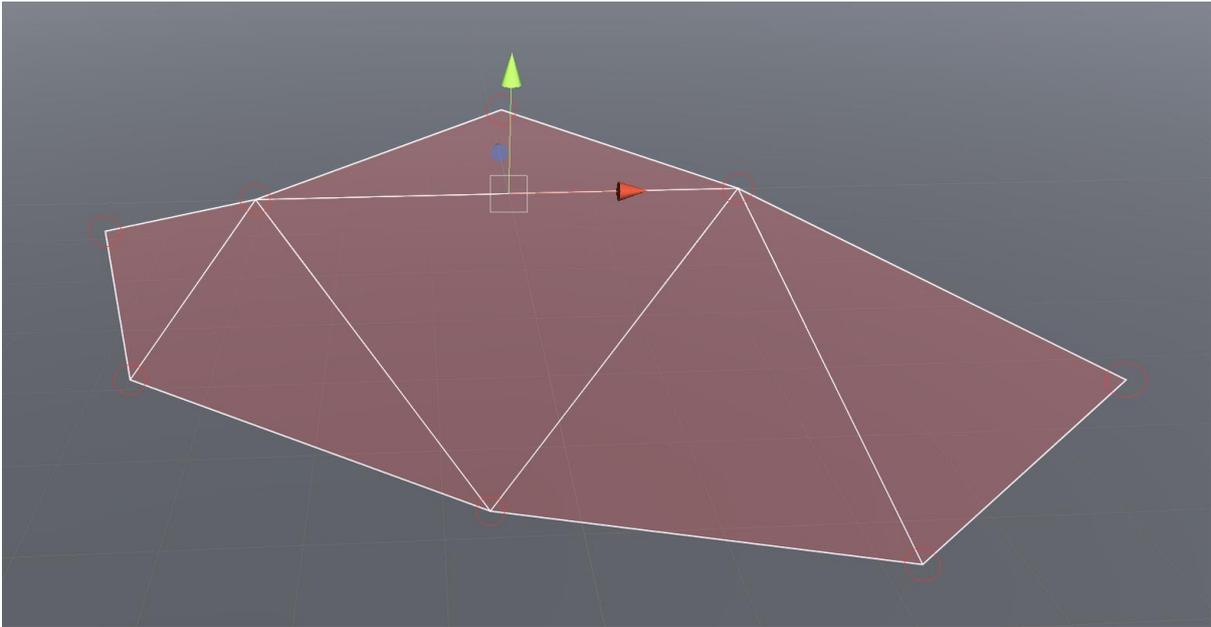
Field	Role
Spawn Point Id	A unique identifier for the spawn point, used for network spawning (see the chapter on network spawning), can be left blank if not networked
Initial Spawn Delay	How long after start the area will check for spawns
Spawn Frequency	How often, after the initial spawn, the area will check for spawns
Spawn Range	How close the player needs to be from a node on the spawn area

Prefabs to Spawn	The list of spawn object, and the corresponding population cap
Prefabs to Spawn Day	The list of spawn objects, and the corresponding population cap, to spawn during the day. Only available if Enviro is installed
Prefabs to Spawn Night	The list of spawn objects, and the corresponding population cap, to spawn during the night. Only available if Enviro is installed
Show Handles	A toggle to show or hide the area nodes manipulation handles
Show Triangulation	A toggle to show the area triangulation
Ground Layer Mask	A LayerMask to indicate which layers the area nodes can be placed on

In order to create the nodes that make up the perimeter of a spawn area, select the spawn area game object and CTRL-click in the scene where you want to create points. The area will be drawn once three points have been created. To add points to an already created area, follow the same process. The new point will be inserted in the perimeter after the closest point. A spawn area in the scene looks like this:



If you want to delete a point, select the spawn area game object then hold CTRL and SHIFT. The handles will change to red circles:



Clicking on a red circle will delete the corresponding point.

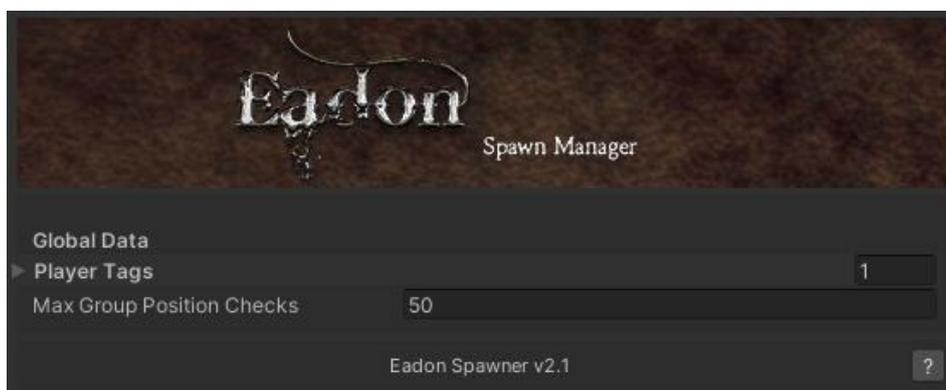
Irrespective of the position in space of the handles, spawning happens on the triangulation area (which is projected from the points on a plane at height 0). When an object is spawned, its height will be set either to the terrain height at that point (for terrain spawning) or at the height of the spawn area game object (for mesh spawning).

If you are creating a spawn area on a terrain, you can see the exact area covered by changing the scene camera to orthographic and view from the top.

Like spawn points, spawn areas will create the pools of Spawnable objects at start.

Spawn Manager

You need one Spawn Manager in the scene. Its role is to spawn from each spawn point according to the spawn point frequency. All spawn happens in parallel in the background, which coupled with spawning from pools gives virtually no fps drop. It looks like this:



The fields are:

Field	Role
Player Tags	A list of all the tags for player objects
Max Group Position Checks	How many times the system will look for a valid group position in a single spawn

Day and Night Cycle

If Enviro is installed in your project, you can enable day and night spawning. This needs to be enabled:

- In the spawn point or area, to spawn different objects during the day and the night
- In the Spawnable object if you want the object to automatically despawn on day/night change

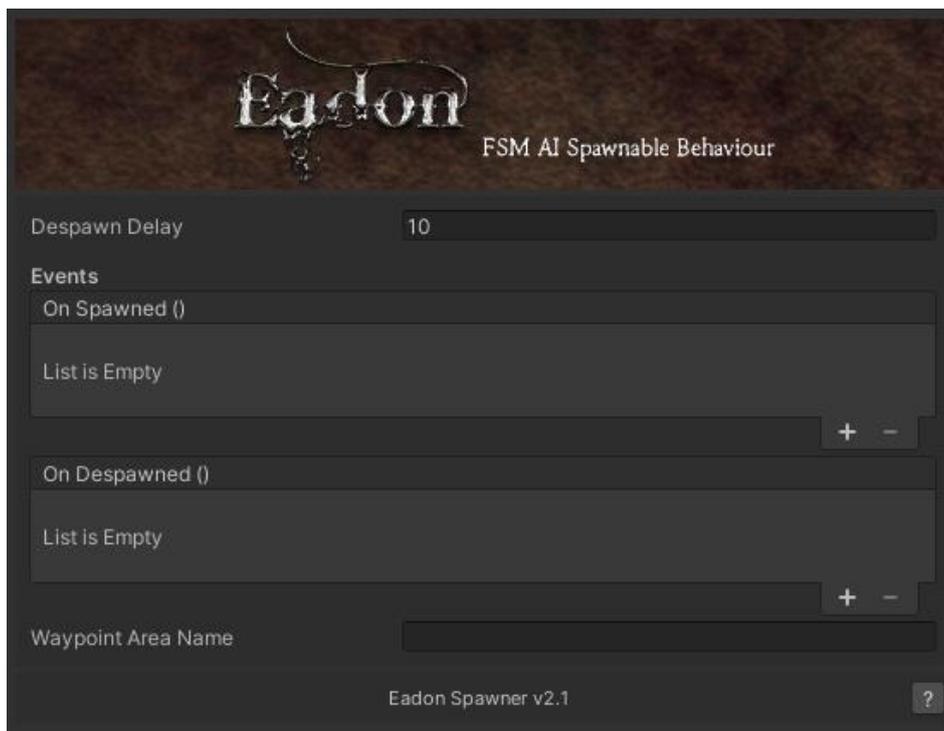
Be aware that automatic despawning follows different rules from normal despawning: if an object is set to automatically despawn, it will despawn if the do not distance is negative or if the player is beyond its do not despawn distance, but the distance between the player and the spawn point (or area) is ignored.

Spawning NPC AIs

NPC AIs are a slightly different case to handle. There are specialised SpawnableObjectBehaviour components for Invector FSM AI, Emerald AI 3.0, Emerald AI 2024 and Eadon AI. The role of these components is to disable the AI when it's placed in the pool (at creation or despawning time) and enable it when spawned. In addition, the component automatically hooks into the AI lifecycle so that on death the AI will automatically be despawned.

Invector FSM AI

The Invector FSM AI component looks like this:

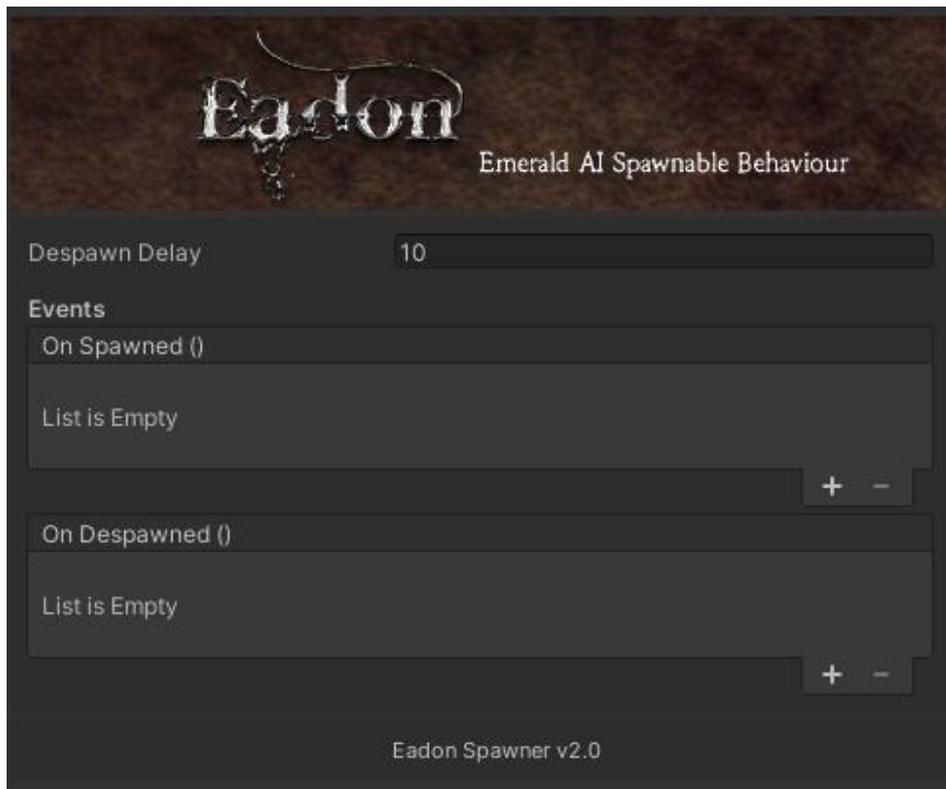


The fields are:

Field	Role
Despawn Delay	How long after death the AI will be despawned
On Spawned	An event triggered on spawn
On Despawnd	An event triggered on despawn
Waypoint Area Name	A field to inject into the FSM AI the waypoint area (normally it's a scene reference which gets lot on the prefab)

Emerald AI 3.0

The Emerald AI component looks like this:

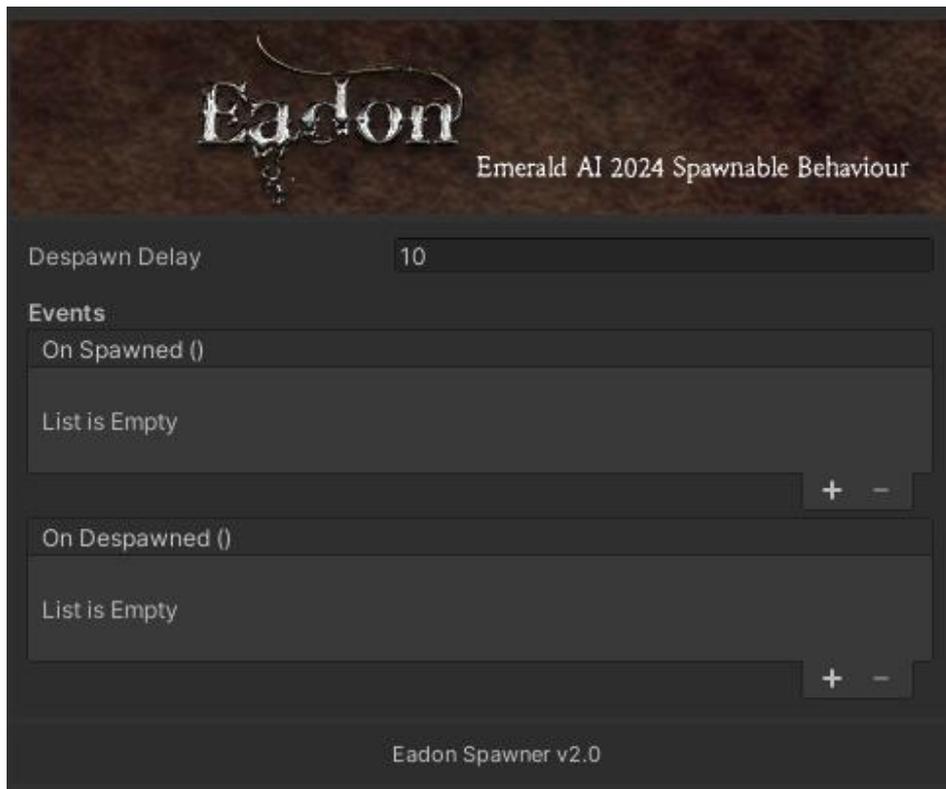


The fields are:

Field	Role
Despawn Delay	How long after death the AI will be despawned
On Spawned	An event triggered on spawn
On Despawned	An event triggered on despawn

[Emerald AI 2024](#)

The Emerald AI component looks like this:

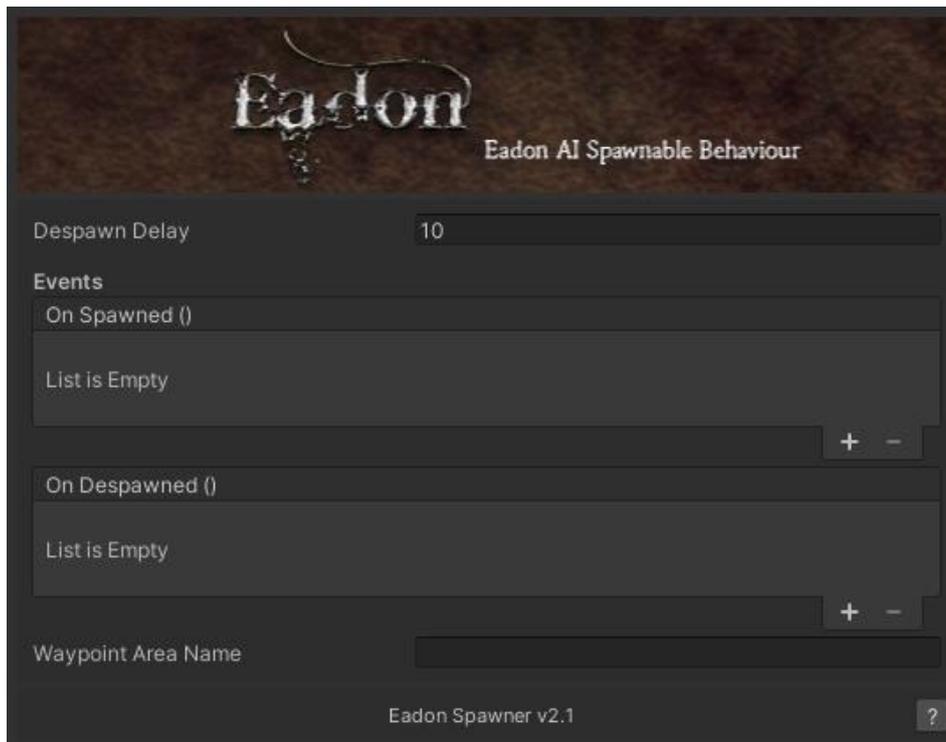


The fields are:

Field	Role
Despawn Delay	How long after death the AI will be despawned
On Spawned	An event triggered on spawn
On Despawned	An event triggered on despawn

Eadon AI

The Eadon AI component looks like this:



The fields are:

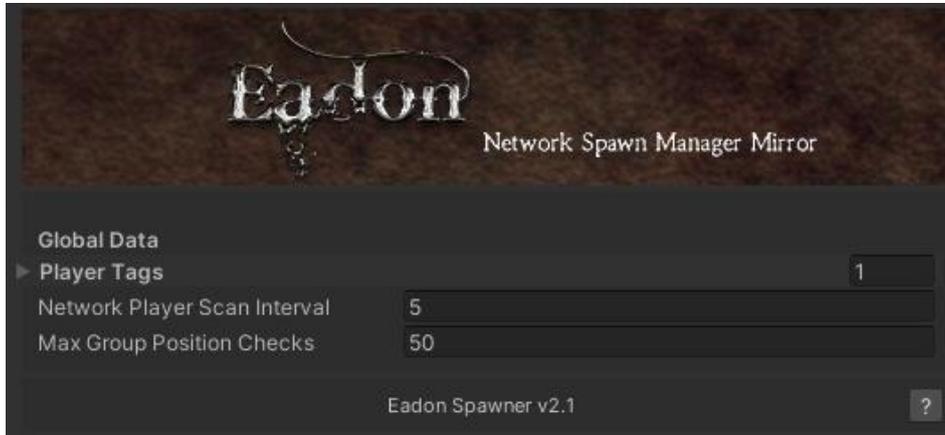
Field	Role
Despawn Delay	How long after death the AI will be despawned
On Spawned	An event triggered on spawn
On Despawned	An event triggered on despawn

Network spawning with Mirror

Network spawning with Mirror follows the same pattern as normal spawning, but you need to use the Mirror version of all the components.

Network Spawn Manager Mirror

Instead of the normal Spawn Manager, use the Mirror version:

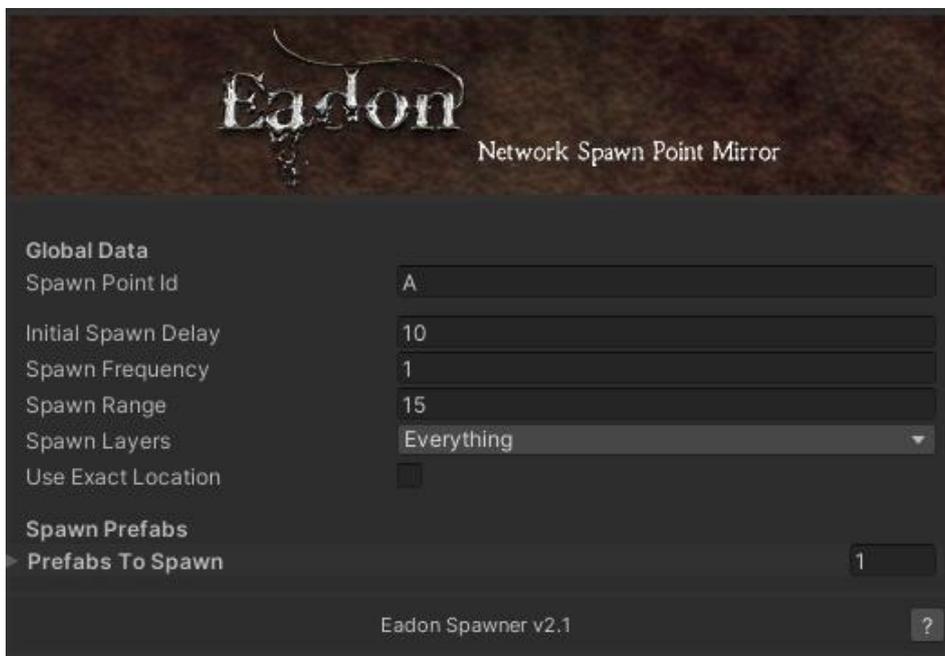


The extra field is

Field	Role
Network Player Scan Interval	How often the spawner should look for new network players

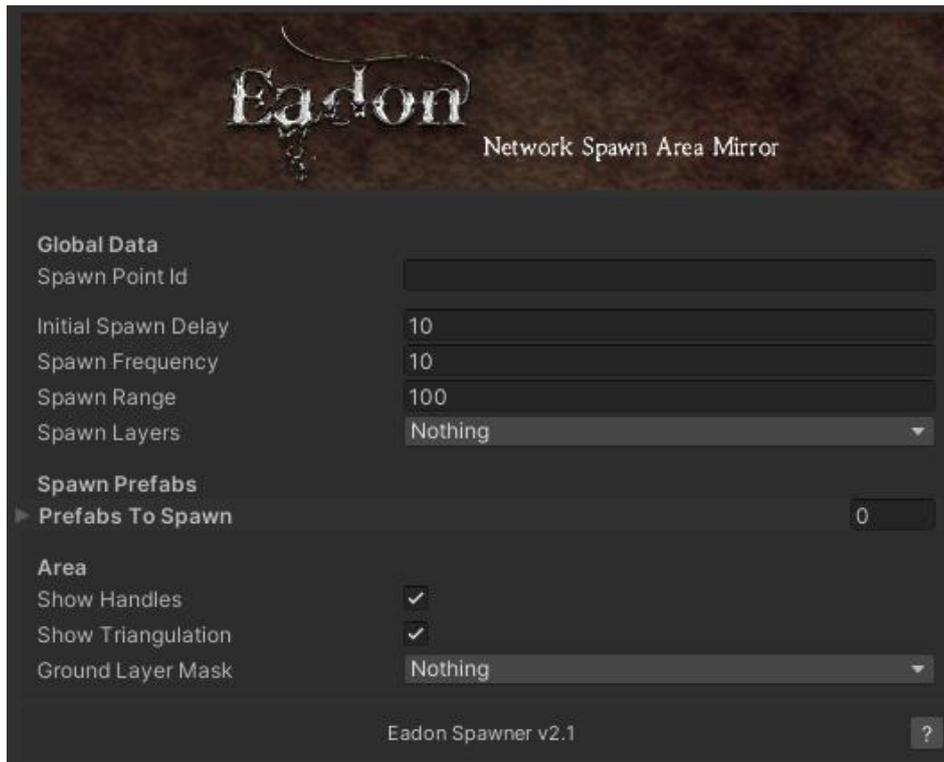
Network Spawn Point Mirror

Instead of the normal Spawn Point, use the Mirror version:



Network Spawn Area Mirror

Instead of the normal Spawn Manager, use the Mirror version:



Spawning with Mirror

In order to enable network spawning, the spawn manager, the spawn points and the spawn areas needs to have a Mirror **NetworkIdentity** component attached. If it's missing, the inspector will display an error message.

Network entities which need state synchronization between server and clients (i.e. any entity with a NetworkTransform, NetworkAnimator, etc) will be pooled server side and spawned from the server to all clients.

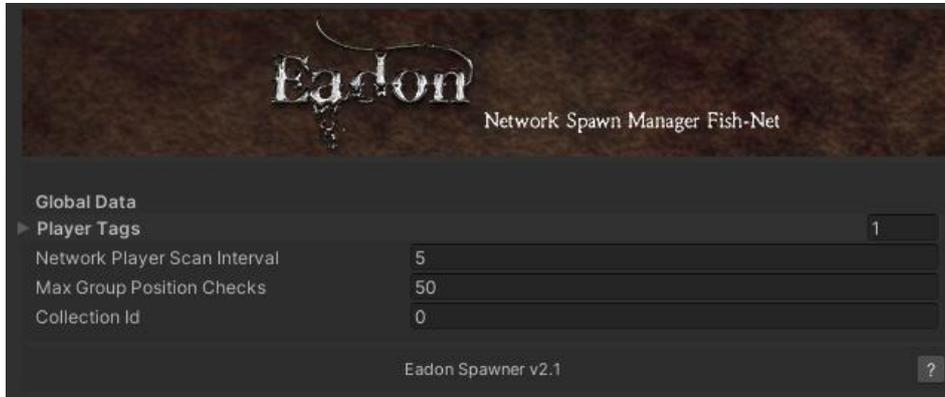
In order for this to work, every spawn point and spawn area in the scene needs to have an unique non empty Spawn Point Id identifier (and if you use level streaming assets like SECTR Complete or World Streamer this restriction on uniqueness applies to the spawn point/areas you have across all scenes that can be in game at the same time).

Network spawning with Fish-Net

Network spawning with Fish-Net follows the same pattern as normal spawning, but you need to use the Fish-Net version of all the components.

Network Spawn Manager Fish-Net

Instead of the normal Spawn Manager, use the Fish-Net version:

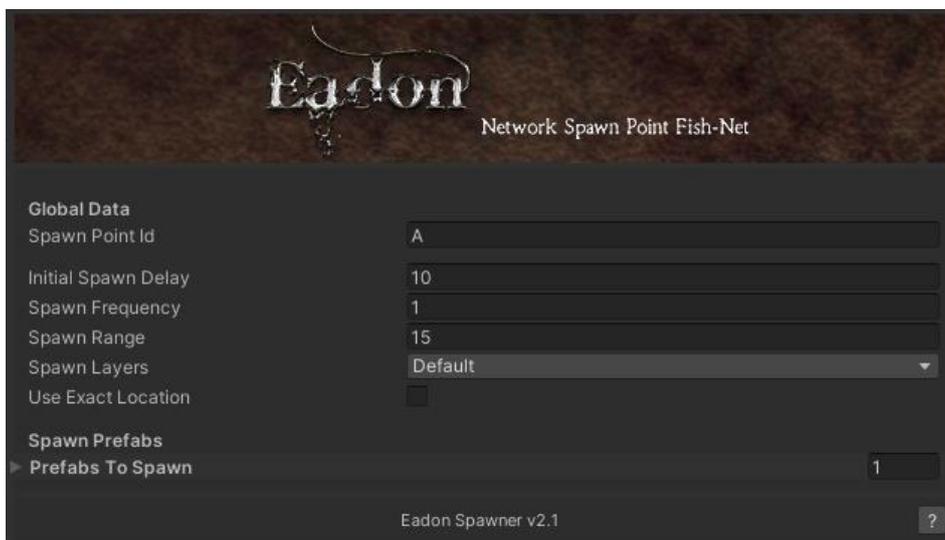


The extra field is

Field	Role
Network Player Scan Interval	How often the spawner should look for new network players

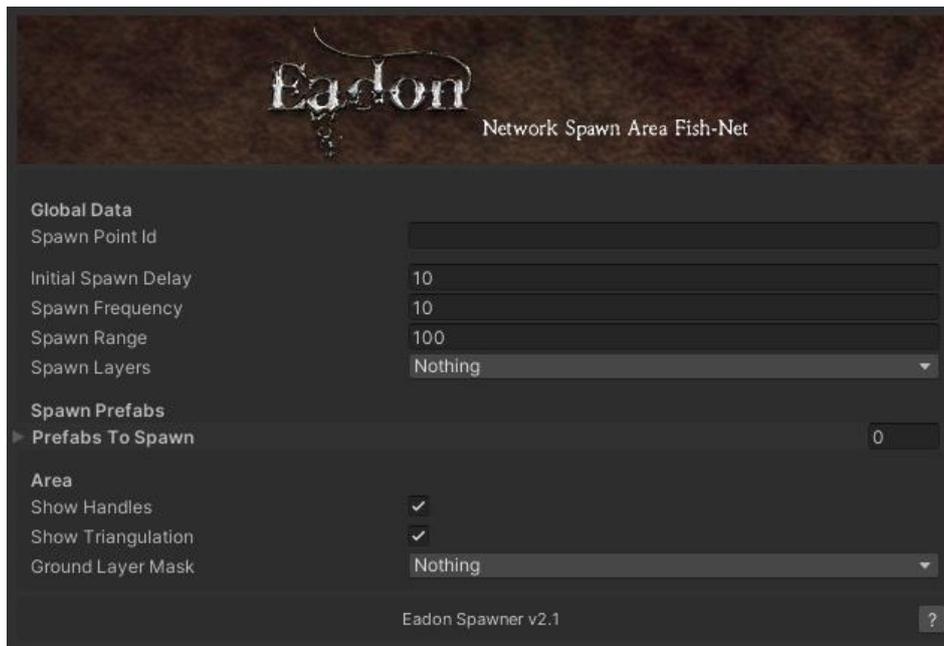
Network Spawn Point Fish-Net

Instead of the normal Spawn Point, use the Fish-Net version:



Network Spawn Area Fish-Net

Instead of the normal Spawn Manager, use the Fish-Net version:



Spawning with Fish-Net

In order to enable network spawning, the spawn manager, the spawn points and the spawn areas needs to have a Fish-Net **NetworkObject** component attached. If it's missing, the inspector will display an error message.

Network entities which need state synchronization between server and clients (i.e. any entity with a NetworkTransform, NetworkAnimator, etc) will be pooled server side and spawned from the server to all clients.

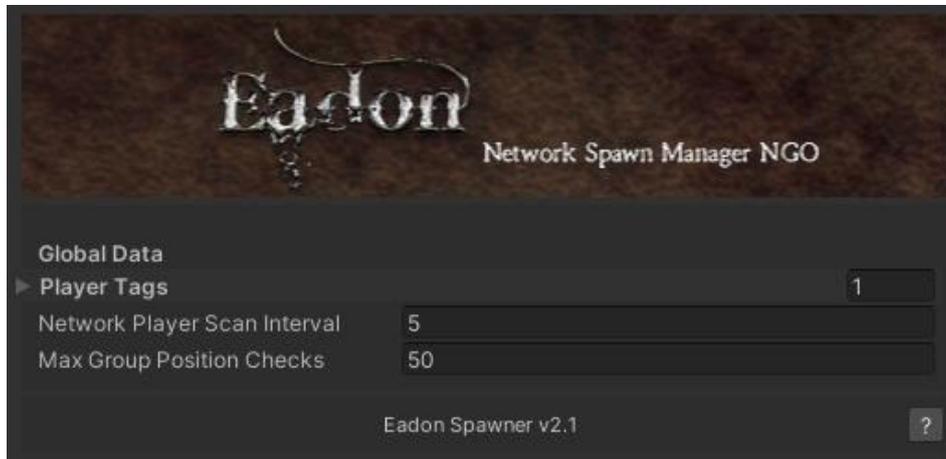
In order for this to work, every spawn point and spawn area in the scene needs to have an unique non empty Spawn Point Id identifier (and if you use level streaming assets like SECTR Complete or World Streamer this restriction on uniqueness applies to the spawn point/areas you have across all scenes that can be in game at the same time).

Network spawning with Netcode for GameObjects

Network spawning with NGO follows the same pattern as normal spawning, but you need to use the NGO version of all the components.

Network Spawn Manager NGO

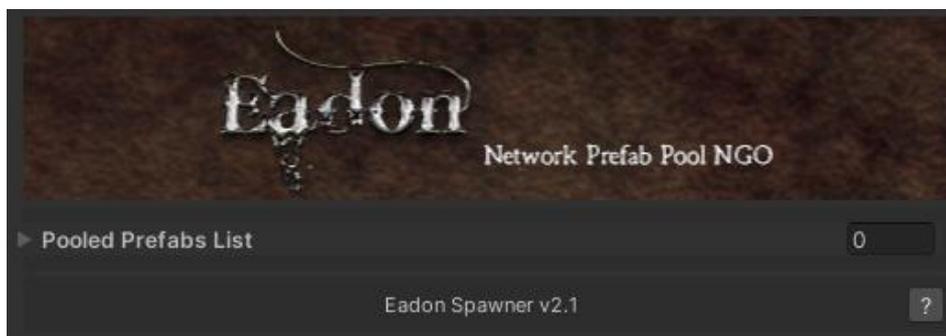
Instead of the normal Spawn Manager, use the NGO version:



The extra field is

Field	Role
Network Player Scan Interval	How often the spawner should look for new network players

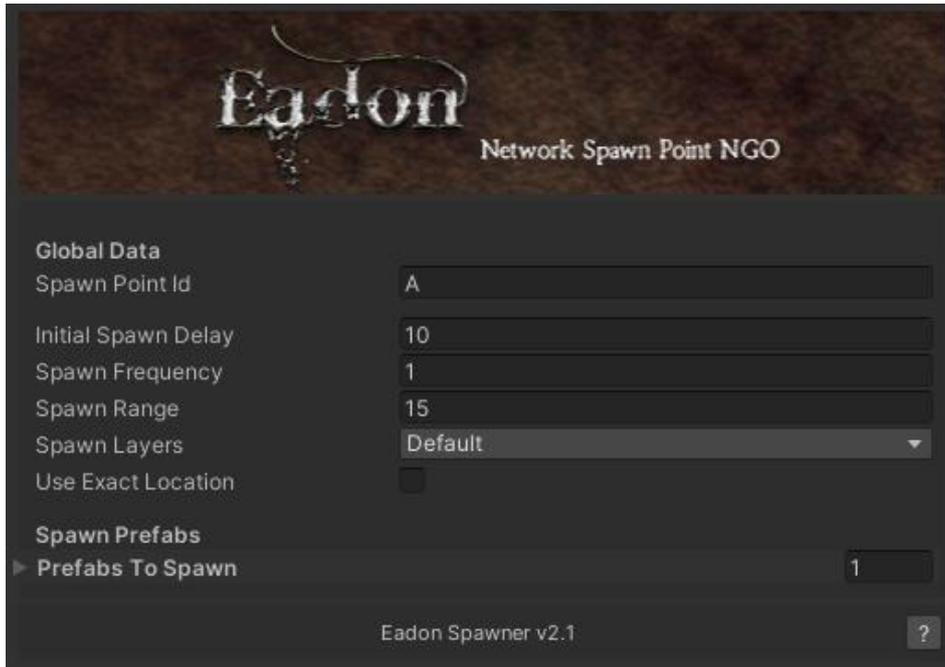
You also need to add to the game object a **NetworkPrefabPoolNgo** component:



The pooled prefab list is populated at runtime when spawn points and spawn areas get enabled.

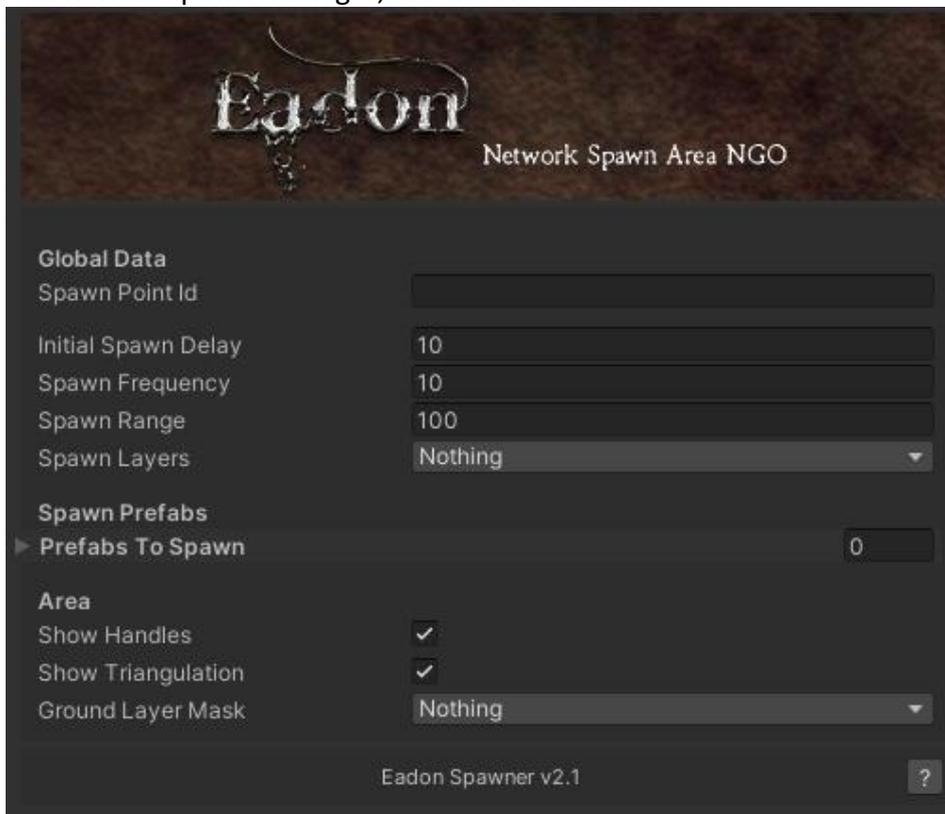
Network Spawn Point NGO

Instead of the normal Spawn Point, use the NGO version:



Network Spawn Area NGO

Instead of the normal Spawn Manager, use the NGO version:



Spawning with Netcode for GameObjects

In order to enable network spawning, the spawn manager, the spawn points and the spawn areas needs to have a NGO **NetworkObject** component attached. If it's missing, the inspector will display an error message.

Network entities which need state synchronization between server and clients (i.e. any entity with a `NetworkTransform`, `NetworkAnimator`, etc) will be pooled server side and spawned from the server to all clients.

In order for this to work, every spawn point and spawn area in the scene needs to have a unique non empty `Spawn Point Id` identifier (and if you use level streaming assets like `SECTR Complete` or `World Streamer` this restriction on uniqueness applies to the spawn point/areas you have across all scenes that can be in game at the same time).