

# Technical Notes

ESAI v4.2

Eric Dobbs

[bf2eai@gmail.com](mailto:bf2eai@gmail.com)

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## About ESAI

ESAI is an AI enhancement project that is both a ready to use system as well as a framework for creating strategic AI code. It started as an attempt to replace the BF2 default strategies with something better. ESAI strategies are organized into sets that are assigned to maps on a per game mode basis. To learn how this is done, read the Users Guide.

## The ESAI Core

The core uses three conditions that test the balance of friendly and enemy control points. If a team holds the same number of control points as the enemy, a *basicAttack* strategy is chosen. If the team has fewer control points than the enemy, a *counterAttack* strategy activates. If the team has more control points, the result is a *pressAttack* strategy.

These three strategy types are subdivided into three families: *Attack*, *AttackHarder*, *AttackHardest*.

The first family has the lowest aggression levels and high SA temperature multipliers for areas such as base starting positions and vehicle depots. The other two families have higher aggression levels, and manipulate SA temperatures in such a way that the front lines of the battle have higher priority.

All core strategies are time limited, so the result is SAI that alternates between resupply and aggressive moves at the enemy.

## ESAI Default Plugins

The default plugins exist to allow for some special conditions to take precedence over the core conditions and subsequently activate some special strategies.

First off, a set of strategies is provided to handle an end game scenario where one team has no control points. The losing team has the strategy *lastStand*, and the winning team uses the strategy *defendMap*.

The other addition is a strategy triggered when there are 2 more neutral strategic areas than owned control points. The *grabNeutrals* strategy most often occurs as a starting break-out, but can be activated at other times as well.

## ESAI Default Strategy Sets

ESAI Strategy Sets are responsible for assigning a group of strategies to each team. There are four default strategy sets: *smallMap*, *mediumMap*, *largeMap*, and *hugeMap*. These strategy sets have corresponding map files that are the glue that binds ESAI to a game mode.

The default strategy sets are enumerated in terms of size. This should be interpreted as relative to the number of control points in the level, not geographic size. As “size” increases the strategies used have longer time limits and more simultaneous attacks available.

## Supported Strategic Area Type Flags

The ESAI core supports temperature multipliers for several Strategic Area types, in addition to the basic multipliers for control points. Some of these flags are dynamic - such as *Front* and *Safe*, while others are static flags that can be assigned to a SA within the file *StrategicAreas.ai*.

To illustrate how this is done, the next page shows a strategic area entry that has been modified for use with ESAI.

```

aiStrategicArea.setActive US_Base
AIStrategicArea.addNeighbour Rear_Base
AIStrategicArea.addNeighbour Forgotten_Village
AIStrategicArea.addNeighbour Supply_Depot
AIStrategicArea.addNeighbour New_Beggining_City
aiStrategicArea.addObjectTypeFlag ControlPoint
aiStrategicArea.addObjectTypeFlag Remote
aiStrategicArea.addObjectTypeFlag Base
AIStrategicArea.setOrderPosition Infantry -223.157/85.3225/-666.157
AIStrategicArea.setOrderPosition Vehicle -205.263/85.3284/-682.168
aiStrategicArea.setSide 0
aiStrategicArea.vehicleSearchRadius 16.9706

```

The lines in blue are the additions used to add a type flag to a strategic area. In this example the strategic area is marked as both *Remote* and as a *Base*.<sup>1</sup> The core strategies use these flags at different times. In the *Attack* family of strategies, the Base flag boosts the area's importance (temperature).

During the *AttackHarder/AttackHardest* strategies, the Remote flag is used to decrease the SA's importance.

The table below lists the ESAI supported type flags and shows when the temperature modifiers are active:

<a href="#">Attack</a>	<a href="#">AttackHarder,AttackHardest</a>
ControlPoint (Neutral)	ControlPoint (Neutral)
ControlPoint (Hostile)	ControlPoint (Hostile)
Base	Safe
AirField	Front
AirSpawner	Remote
LandSpawner	
SupplyPoint	

The values for these multipliers are defined as constants in the file *esaivars.ai*. These weights are unique to each family of strategies, and to the sub variants within each family.

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<sup>1</sup> Most strategic areas will already have the flag for *ControlPoint* set, but strategic areas do not **have** to be tied to control points.