

BFME AI Tutorial

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Introduction

The Purpose of this tutorial is to give the reader a general idea of how the BFME1 AI system works. I will not be going into much depth on how to make the AI do certain things rather what each AI file performs so you can figure out what to do. These are just my observations and acquired knowledge from both scouring the internet and trial and error. As always feedback is welcomed. Thanks

Screenshots were taken while working on the Shadow and Flame AI, where I've made a significant amount of changes to either fix/optimize EA scripts/systems and add my own expansions to it. So some things might have slight variations, aka don't freak out if there's a script in the screenshot that doesn't exist in your libraries.

Layout of the AI

Every faction has a skirmish .map file that contains how it will play. It is made up of other AI .map files. You will notice that there is a difference in the naming convention of the folders, some start with “AI - “ vs “Lib - “.

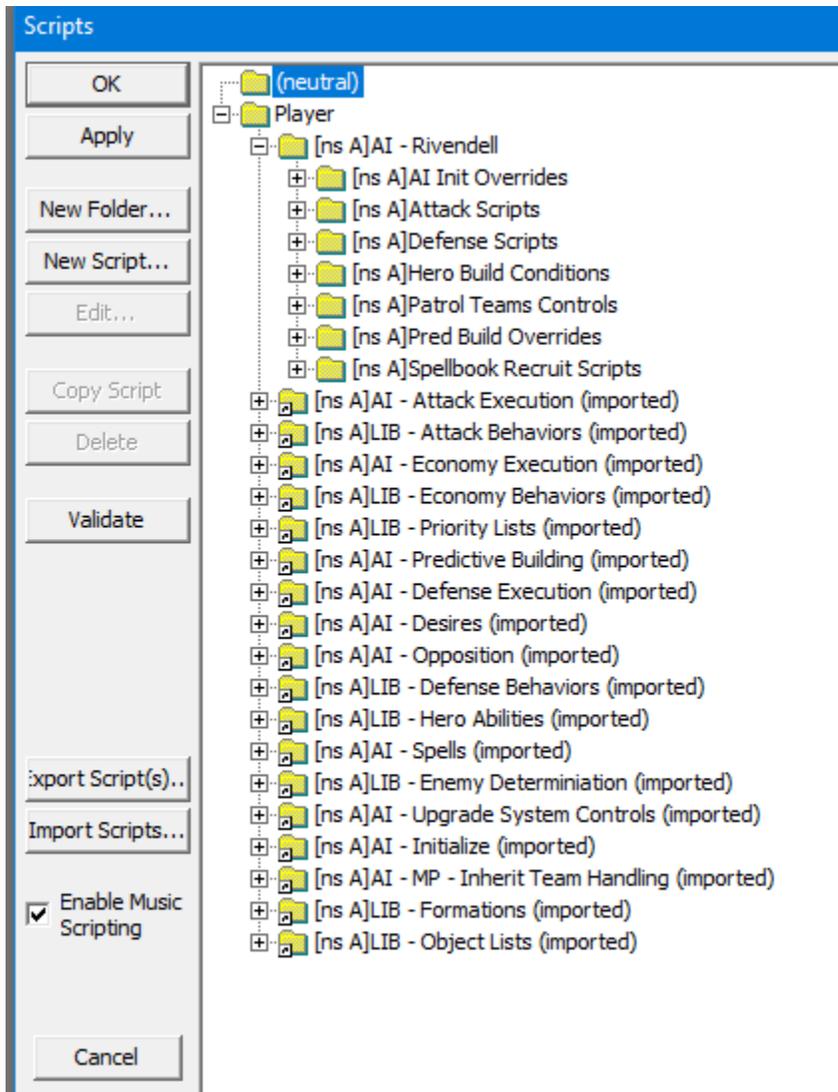
A Lib is a AI Library .map file made up of a bunch of scripts describing the different types of behaviors the AI can do.

A “AI - “ .map file is made up of scripts that control how the AI will play and use the AI Library behavior scripts.



ai_faction.map

Basic building block of the faction AI made up of all the other AI/LIB .map files. Most of the scripts here override scripts from the other AI/LIB .map files with faction specific behavior, units, and buildings.



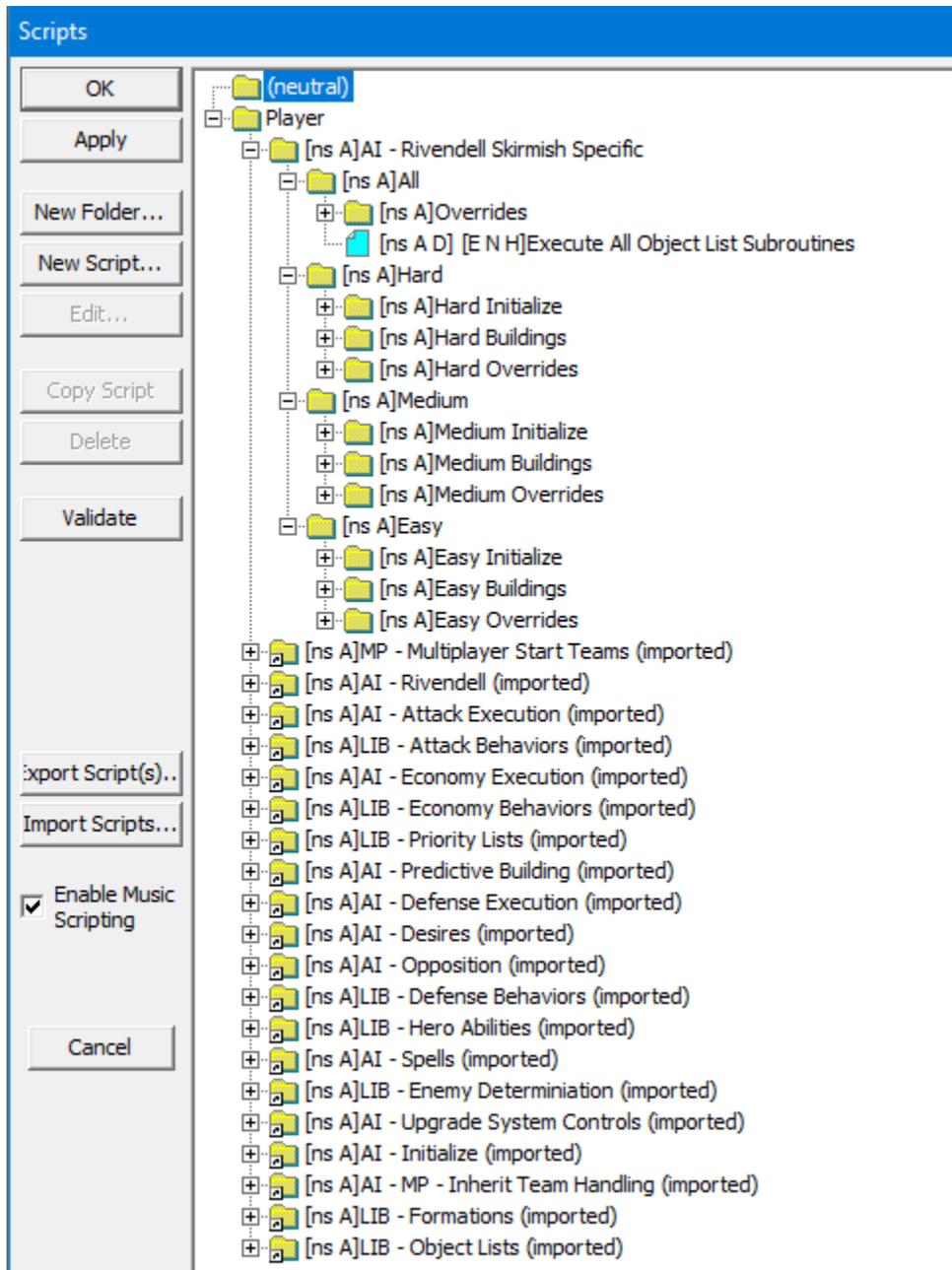
It also has all the AI teams the AI will create during a game under the **Edit Teams** tab. These teams are controlled by scripts under the **Trigger** column. You can edit the teams here to increase/decrease the number and kinds of units the AI creates and how the AI uses these teams, when it builds them, what it does with them, etc.

The screenshot shows the 'Team Builder' interface. At the top, there is a toolbar with various icons, including a 'Scripts' icon. A red arrow points from this icon to the 'Trigger' column of the table below. The table lists various AI teams with their names, behaviors, and triggers.

Team Name	Behavior	Imported	Overridden	Origin	Priority	Script	Trigger
(neutral)							
Player							
(default team)	Normal				0		
===== Hero Teams	Normal				0		
Hero - Elrond	Aggressive				150	b_Attack - Hunt Immediate	a_BC - Elrond
Hero - Glorfindel	Aggressive				200	b_Attack - Hunt Immediate	a_BC - Always True with Money
Hero - Twins	Aggressive				150	b_Attack - Hunt Immediate	a_BC - Twins
Hero - Gildor	Aggressive				150	b_Attack - Hunt Immediate	a_BC - Gildor
Hero - AragornII	Aggressive				150	b_Attack - Hunt Immediate	a_BC - AragornII
Hero - Halbarad	Aggressive				150	b_Attack - Hunt Immediate	a_BC - Halbarad
Hero - Farmer Maggot	Aggressive				100	b_Attack - Hunt Immediate	a_BC - Farmer Maggot
===== Summoned Teams	Normal				0		
Many Meetings Summon	Aggressive				120	b_Attack - Hunt Immediate	
Grey Pilgrim Summon	Aggressive				200	b_Attack - Hunt Immediate	
===== Specialized Teams	Normal				0		
Creep Hunters	Aggressive				120	b_AIAttack - Move to ne...	a_BC - Creep Hunters
Defense - AntiArtilery Close	Alert				100	b_Defense - Respond to ...	
Defense - AntiArtilery Ranged	Alert				100	b_Defense - Respond to ...	
===== Economy Teams	Normal				0		
Economy - Expansion Econ Team	Aggressive				110	b_Econ_Secure_LumberMill	e_BC_Vacant_Econ_Plot_Available
Economy - Expansion Team	Aggressive				200	b_Econ_Secure_Camp	e_BC_Vacant_Camp_Plot_Available and Desired
===== Patrol Teams	Normal				0		
Patrol Team Early Game	Alert				65	TS Patrol Team	C Patrol Team Early Game
Patrol Team Mid Game 01	Alert				65	TS Patrol Team	C Patrol Team Mid Game 01
Patrol Team Mid Game 02	Alert				65	TS Patrol Team	C Patrol Team Mid Game 02
Patrol Team Late Game 01	Alert				75	TS Patrol Team	C Patrol Team Late Game 01
Patrol Team Late Game 02	Alert				75	TS Patrol Team	C Patrol Team Late Game 02
===== Defense Teams	Normal				0		
Defense - Archer Team	Aggressive				85	b_Defend Patrol Base De...	d_BC - Defend Wave 1 Archers
Defense - Spearmen Team	Aggressive				85	b_Defend Nearest Choke...	d_BC - Defend Wave 1 Spearmen
Defense - Infantry Team	Aggressive				85	b_Defend Base	d_BC - Defend Wave 1 Infantry
===== Attack Teams	Normal				0		
Attack Team - Battling Ram	Aggressive				85	b_Attack - Hunt Immediate	a_BC - Breeland Rams
Attack Team - Breeland Infantry	Aggressive				75	b_Attack - Hunt Immediate	a_BC - Wave 1
Attack Team - Dunedain Infantry	Aggressive				75	b_Attack - Hunt Immediate	a_BC - Wave 2 Infantry
Attack Team - Elven Infantry	Aggressive				75	b_Attack - Hunt Immediate	a_BC - Wave 3 Infantry
Attack Team - Rivendell Knights	Aggressive				75	b_Attack - Hunt Immediate	a_BC - Wave 5 Cavalry
===== Attack Weakpoint Merge Teams	Normal				0		
Attack Team - Hobbit Archers	Aggressive				75		a_BC - Wave 1
Attack Team - Hobbit Bounders	Aggressive				75		a_BC - Wave 1
Attack Team - Breeland Guards	Aggressive				75		a_BC - Wave 2
Attack Team - Dunedain Rangers	Aggressive				75		a_BC - Wave 3
Attack Team - Grey Company Ranger	Aggressive				75		a_BC - Wave 3
Attack Team - Rivendell Guardians	Aggressive				75		a_BC - Wave 3
Attack Team - Rivendell Veterans	Aggressive				75		a_BC - Wave 5
AI Attack Weakpoint - Archers	Aggressive				1000	b_AIAttackTeam - Set to ...	
AI Attack Weakpoint - Infantry	Aggressive				1000	b_AIAttackTeam - Set to ...	
AI Attack NonWeakpoint - Archers	Aggressive				1000	b_AIAttackTeam - Set to ...	
AI Attack NonWeakpoint - Infantry	Aggressive				1000	b_AIAttackTeam - Set to ...	
===== End of Rivendell Teams	Normal				0		

ai_factionskirmish.map

The actual .map file that is used in a skirmish game. This file contains skirmish specific scripts for the different AI difficulties. It can also contain special skirmish only teams under the **Edit Teams** tab.



ai_debug.map

You can add this to your test maps or any map and it will report AI Attack, Defense, and Urgency parameters in game by displaying text on screen. You can also expand this system to show other strings by looking at what's already been done there.

To Add to your maps:

- Open your map
- Go to Edit -> Player List -> Library Maps -> Add

***Game Data AI Debug Mode**

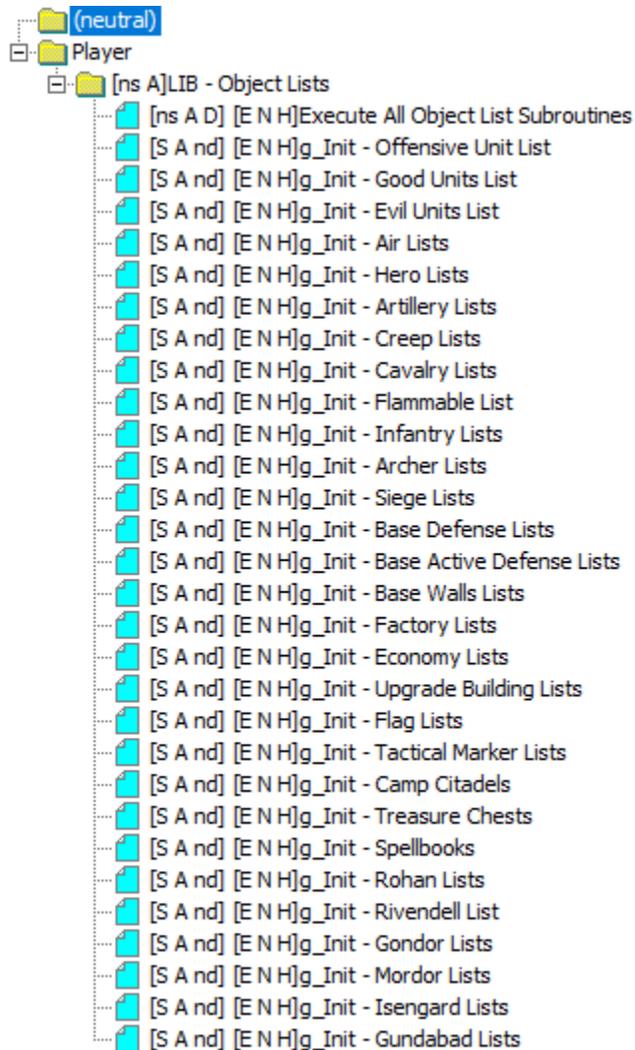
There are two settings in gamedata.ini you can enable by changing them from "No" to "Yes" to help debug AI. Not sure how useful these are currently.

DebugAI = Yes : Shows pathing markers. Not sure what triggers them

DebugAIObstacles = Yes : Idk yet but i'm guessing it shows when an AI tries to path through an obstacle??

lib_object_lists.map

Contains scripts with objects lists that tell the AI all the available units and objects in the game. These object lists are also used to create AI scripts.



lib_enemy_determination.map

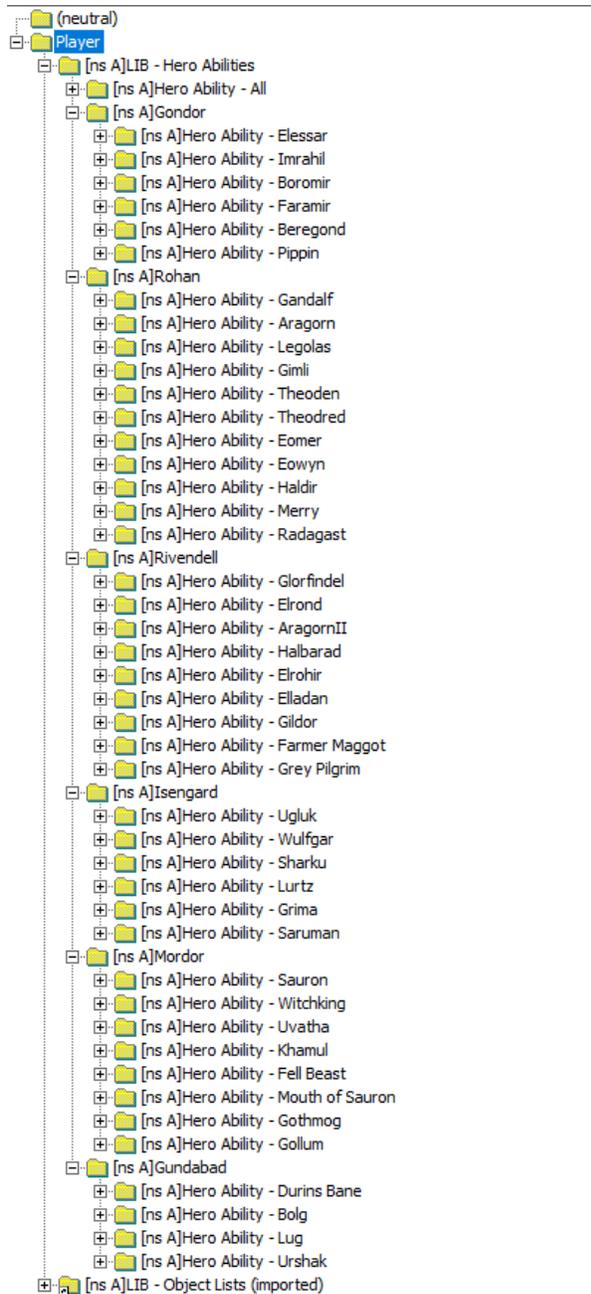
Determines what enemy factions the AI is up against.

lib_priority_lists.map

Contains attack priority lists used by teams under the **Edit Teams** tab.

lib_hero_behaviors.map

Contains scripts used by hero teams, defining how they should use their special abilities. Edit the scripts here to make the AI use its hero powers more efficiently or add new scripts for new abilities here. (NOTE: This folder won't be organized by faction like I've done below.)



lib_formation_behaviors.map

Contains scripts used by teams that control when and how the AI uses unit formations.

lib_attack_behaviors.map

LIB - Attack Behaviors -> Specialized Attack Behaviors: Has scripts for creating specialized attack teams that do certain functions. For example the ranger team you can create that will go around the map trying to ambush units.

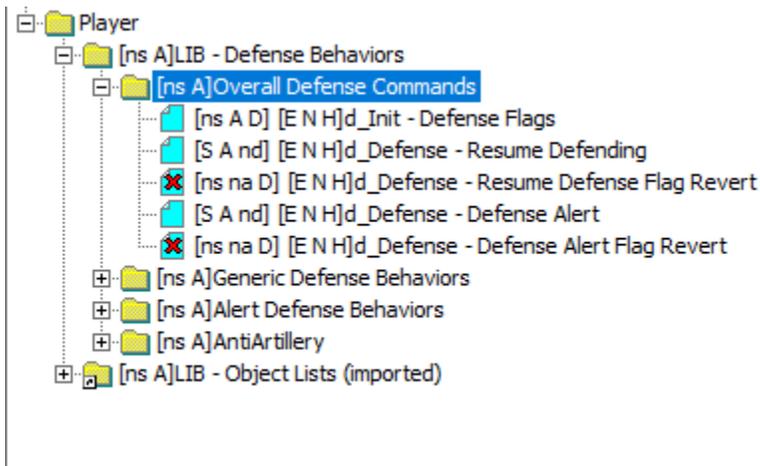
*To use these, add the scripts starting with “b_Attack - “ to either the On Create Script Behavior Trigger or in the generic tab. I would look at the Ranger Ambush scripts to get an idea of how you can create your own special attack behaviors.

LIB - Attack Behaviors -> General Attack Behaviors: Has more generalized attack scripts for creating different types of attack teams.

** Never add the scripts that start with “be_Attack ...” to teams, they will not work as intended.

lib_defense_behaviors.map

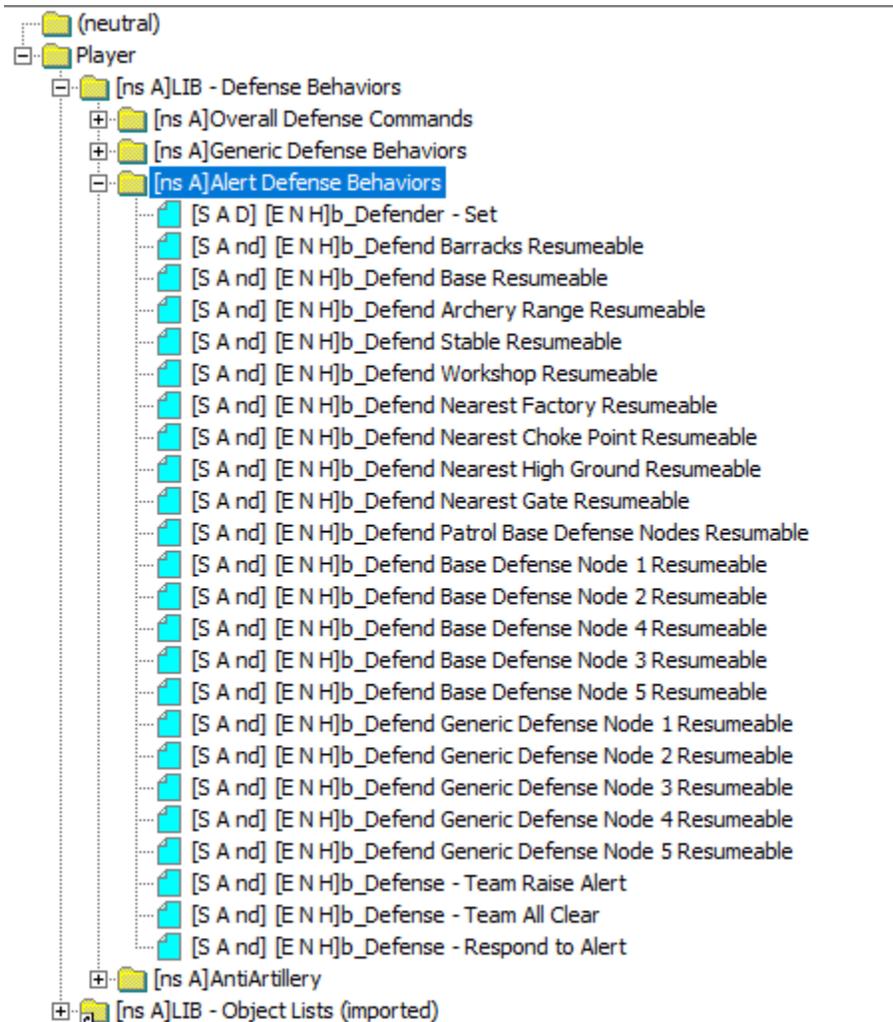
Lib - Defense Behaviors -> Generic Defense Behaviors : A bunch of scripts for initializing and resetting defense teams.



Lib - Defense Behaviors -> Generic Defense Behaviors : A bunch of scripts for sending the AI teams to defend various parts of an AI's base.

- (neutral)
- Player
 - [ns A]LIB - Defense Behaviors
 - [ns A]Overall Defense Commands
 - [ns A]Generic Defense Behaviors
 - [S A nd] [E N H]b_Defend Gate Repair
 - [S A nd] [E N H]b_Defend Gate Repair - Disband
 - [S A nd] [E N H]b_Defend Garrison Nearest
 - [S A nd] [E N H]b_Defend Base
 - [S A nd] [E N H]b_Defend Barracks
 - [S A nd] [E N H]b_Defend Archery Range
 - [S A nd] [E N H]b_Defend Stable
 - [S A nd] [E N H]b_Defend Workshop
 - [S A nd] [E N H]b_Defend Nearest Factory
 - [S A nd] [E N H]b_Defend Patrol Base Defense Nodes
 - [S A nd] [E N H]be_Defend Patrol Base Defense Nodes
 - [S A nd] [E N H]b_Defend Nearest Choke Point
 - [S A nd] [E N H]be_Defend Nearest Choke Point
 - [S A nd] [E N H]b_Defend Nearest High Ground
 - [S A nd] [E N H]be_Defend Nearest High Ground
 - [S A nd] [E N H]b_Defend Nearest Gate
 - [S A nd] [E N H]be_Defend Nearest Gate
 - [S A nd] [E N H]b_Defend Base Defense Node 1 - Stand Ground
 - [S A nd] [E N H]be_Defend Base Defense Node 1 - Stand Ground
 - [S A nd] [E N H]b_Defend Base Defense Node 2 - Stand Ground
 - [S A nd] [E N H]be_Defend Base Defense Node 2 - Stand Ground
 - [S A nd] [E N H]b_Defend Base Defense Node 3 - Stand Ground
 - [S A nd] [E N H]be_Defend Base Defense Node 3 - Stand Ground
 - [S A nd] [E N H]b_Defend Base Defense Node 4 - Stand Ground
 - [S A nd] [E N H]be_Defend Base Defense Node 4 - Stand Ground
 - [S A nd] [E N H]b_Defend Base Defense Node 1
 - [S A nd] [E N H]be_Defend Base Defense Node 1
 - [S A nd] [E N H]b_Defend Base Defense Node 2
 - [S A nd] [E N H]be_Defend Base Defense Node 2
 - [S A nd] [E N H]b_Defend Base Defense Node 3
 - [S A nd] [E N H]be_Defend Base Defense Node 3
 - [S A nd] [E N H]b_Defend Base Defense Node 4
 - [S A nd] [E N H]be_Defend Base Defense Node 4
 - [S A nd] [E N H]b_Defend Base Defense Node 5
 - [S A nd] [E N H]be_Defend Base Defense Node 5
 - [S A nd] [E N H]b_Defend Generic Defense Node 1
 - [S A nd] [E N H]be_Defend Generic Defense Node 1
 - [S A nd] [E N H]b_Defend Generic Defense Node 2
 - [S A nd] [E N H]be_Defend Generic Defense Node 2
 - [S A nd] [E N H]b_Defend Generic Defense Node 3
 - [S A nd] [E N H]be_Defend Generic Defense Node 3
 - [S A nd] [E N H]b_Defend Generic Defense Node 4
 - [S A nd] [E N H]be_Defend Generic Defense Node 4
 - [S A nd] [E N H]b_Defend Generic Defense Node 5
 - [S A nd] [E N H]be_Defend Generic Defense Node 5
 - [ns A]Alert Defense Behaviors
 - [ns A]AntiArtillery
 - [ns A]LIB - Object Lists (imported)

Lib - Defense Behaviors -> Alert Defense Behaviors : Scripts for handling which defense nodes teams defend.



Lib - Defense Behaviors -> Anti Artillery : The Anti Artillery teams are called and made on the fly when units are attacked by artillery then disbanded once it's clear by sending them back to the nearest AI base.



lib_economy_behaviors.map

Contains scripts for creating teams that secure econ plots and expansions such as outposts, camps, and castles.

Also has scripts that pause unit production to let the economy recover when the AI is losing a lot of money

ai_mp_inherit_management.map

Handles assigning base flags to players when the game starts.

ai_initialize.map

AI- Initialize -> Override-able Paperwork: Initializes the different AI subsystems (ie. economy, defend, opposition, upgrade, predictive building and defensive building values). Every faction overrides these parameters in their respective factionskirimish.map files.

AI- Initialize -> Non Override-able Paperwork: Various scripts related to setting up AI.

AI- Initialize -> Inherit: Transfer control of starting position to AI.

AI- Initialize -> Unpack Initial Flag: Unpacks starting base that the AI inherits from above.

ai_opposition.map

AI- Opposition -> Opposition Types: Scripts that have counters that track the number of enemy units and buildings.

AI- Opposition -> Opposition Areas: Scripts that detect threat levels around the AI base (Flanks, Center, Backdoor).

ai_desires.map

AI Desires Global : General scripts that make sure AI Desires don't bottom out and also scripts for when an AI loses.

AI Desires Attack : Things that affect the AI's attack desire: AI Command points available, number of attack teams on the field, and the amount of time the AI has been on the map.

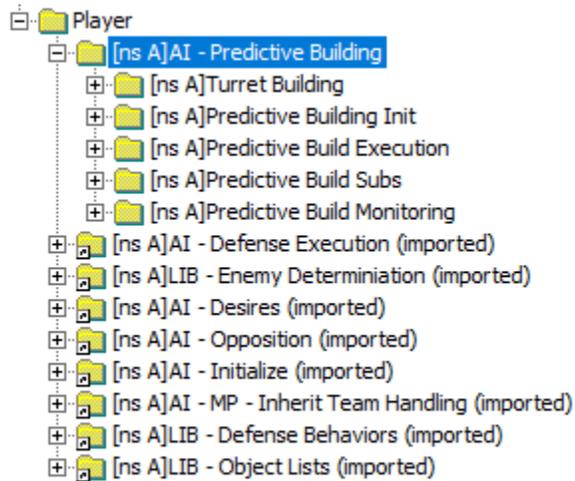
AI Desires Defense: Things that affect the AI's defense desire: number of offensive units on the enemy's teams, the threat level around a base, if a base is attacked, and the current number of potential defensive structures versus how many are built.

AI Desires Economy: Monitors the AI's economy by keeping track of its money in/out and it also controls how bad the AI will want to expand based on available flag expansions.

AI Desires Tech Tree: Controls the AI tech levels of which there are 3. The AI will build different units/heroes/buildings based on tech level.

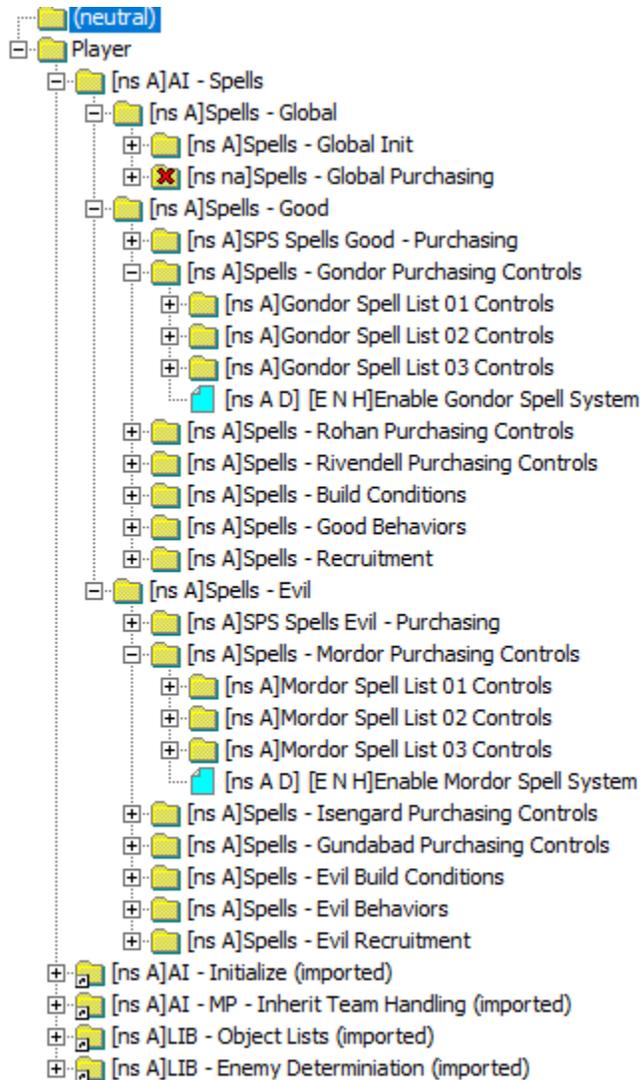
ai_predictive_building.map

Contains scripts that control what kind of buildings the AI builds in response to the type of units/buildings the opposing players are fielding.



ai_spell_exection.map

Contains scripts that control the AI Spellbook purchasing behavior as well as how and when they use Spellbook powers. The **Edit Teams** tab also contains special Spellbook teams. You would modify AI Spellbook behaviors and add any new powers for your faction here.



ai_upgrade_execution.map

Contains scripts that control how the AI purchases unit/castle upgrades as well as purchasing upgrades for units.

ai_attack_execution.map

AI- Attack Execution -> Attack General: Controls launching the general attack scripts that may be on attack teams.

AI- Attack Execution -> Attack Enemy Base: Bunch of scripts used to create teams that attack enemy bases.

AI- Attack Execution -> Attack Enemy Base -> Attack Behaviors: Has one script that allows teams with loadable units such as siege towers or ladders to be loaded.

AI- Attack Execution -> Attack Failed -> Attack Failed: Has one script that allows teams to retreat should they not be able to get to the unit that's attacking them.

AI- Attack Execution -> Attack Enemy Base -> Behavior Overrides: Looks like the scripts in this folder are overriding these behavior scripts from the "LIB - Attack Behaviors" file, not really sure on why.

AI- Attack Execution -> Patrolling: Has a bunch of scripts for creating attack teams that patrol the "combat_areas" around the map.

AI- Attack Execution -> Creep Elimination: Has two scripts, one that sets a build condition for the "Creep Hunters" team in the team tab and another to have the team collect any treasure yielded.

AI- Attack Execution -> Attack Build Conditions: A bunch of scripts detailing build conditions for attack teams, you can edit these to create a very elaborate AI attack wave system.

*To use these you're going to want to add the "b_AIAttack - ..." scripts to your teams. The "b_AIAttackTeam - ..." scripts are used by the weakpoint teams in the team builder tab. I haven't quite figured out how this part of the system works.

ai_attack_execution.map Team Builder Tab

Weakpoint/Nonweakpoints Teams

This is what all teams with “Join AI Attack Weakpoint/NonWeakpoint” scripts merge into to form a giant attack wave when attacking enemy bases. Weakpoint teams attack the weak points of the enemy base and vice versa.

AI Attack Weakpoint - Infantry: Anti-Archer Priority, attack center, flank, and backdoor.

AI Attack Weakpoint - Archers: Anti-Cavalry Priority, attack center, flank, and backdoor.

AI Attack Weakpoint - Cavalry: Anti-Archer Priority, attack center, flank, and backdoor.

AI Attack Weakpoint - Artillery: Anti-Base Defences Priority, attack center, flank, and backdoor.

AI Attack Weakpoint - Over the Wall Team: Appears to be what teams that attack Walls merge into such as siege ladders and siege towers.

AI Attack NonWeakpoint - Infantry: Anti-Archer Priority, attack strong center, strong flank, and strong backdoor.

AI Attack NonWeakpoint - Archers: Anti-Cavalry Priority, attack strong center, strong flank, and strong backdoor.

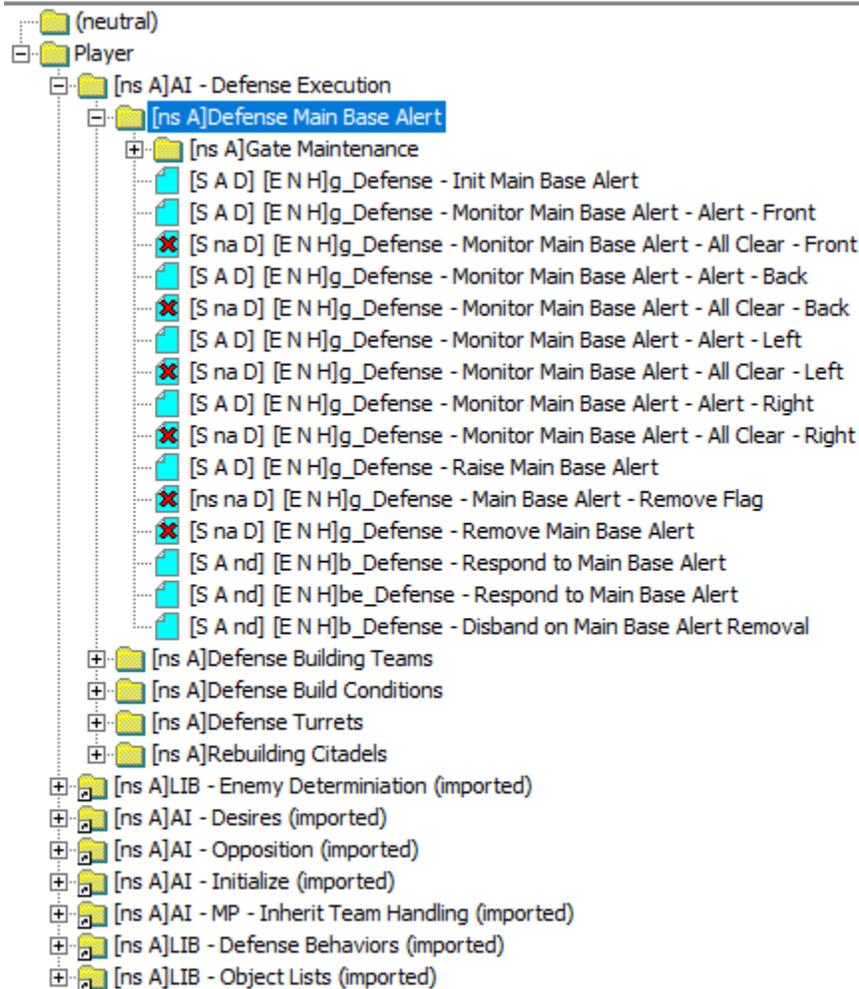
AI Attack NonWeakpoint - Cavalry: Anti-Archer Priority, attack strong center, strong flank, and strong backdoor.

AI Attack NonWeakpoint - Artillery: Anti-Base Defences Priority, attack strong center, strong flank, and strong backdoor.

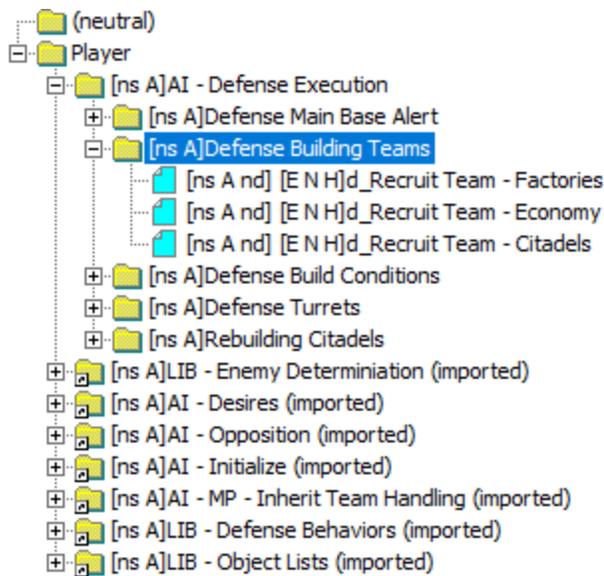
AI Attack Hunt Team: Anti-Archer Priority, has a hunt pulsing script that refreshes every 30 seconds.

ai_defend_execution.map

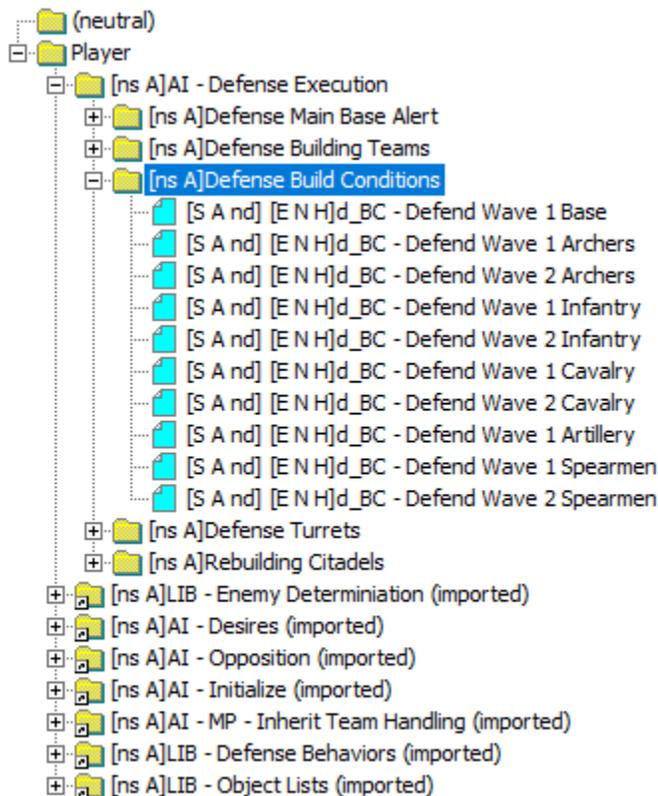
AI - Defense Execution -> Defense Main Base Alert: AI gate control scripts and main base monitoring so we know we need to defend our base or close/open our gates.



AI - Defense Execution -> Defense Building Teams: Need to further investigate. Don't Appear to be used though.

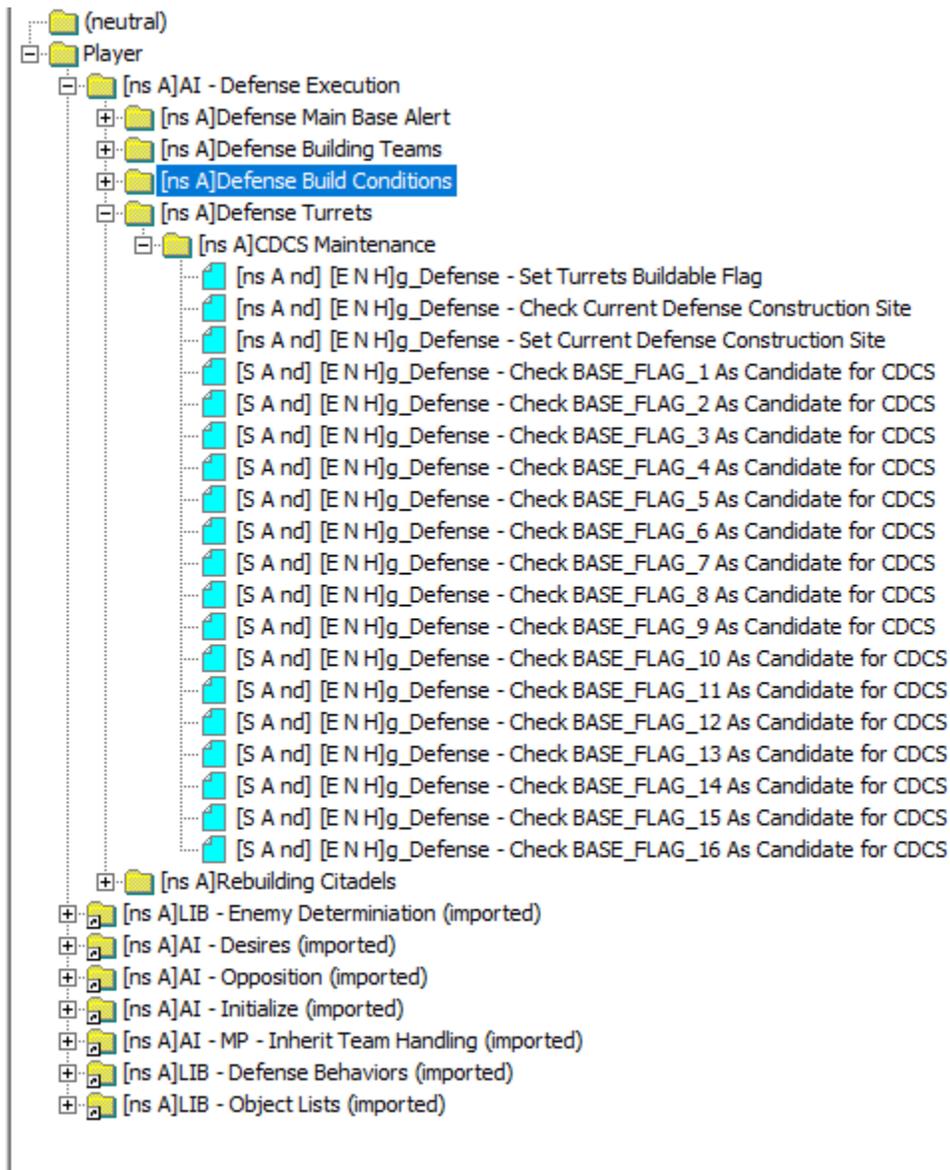


AI - Defense Execution -> Defense Build Conditions: Scripts that set build conditions for defense wave teams.



AI - Defense Execution -> Defense Turrets -> CDCS Maintenance :
Controls changing the AI_CURRENT_DEF_CONSTRUCTION_SITE

across different BASE_FLAGS so the AI can build sentry towers.



AI - Defense Execution -> Rebuilding Citadels: Self-explanatory

- ⊖ (neutral)
- ⊖ Player
 - ⊖ [ns A]AI - Defense Execution
 - ⊕ [ns A]Defense Main Base Alert
 - ⊕ [ns A]Defense Building Teams
 - ⊕ [ns A]Defense Build Conditions
 - ⊕ [ns A]Defense Turrets
 - ⊖ [ns A]Rebuilding Citadels
 - ⊕ [ns A nd] [E N H]g_Defense - Rebuild Citadel
 - ⊕ [ns A]LIB - Enemy Determination (imported)
 - ⊕ [ns A]AI - Desires (imported)
 - ⊕ [ns A]AI - Opposition (imported)
 - ⊕ [ns A]AI - Initialize (imported)
 - ⊕ [ns A]AI - MP - Inherit Team Handling (imported)
 - ⊕ [ns A]LIB - Defense Behaviors (imported)
 - ⊕ [ns A]LIB - Object Lists (imported)

ai_economy_execution.map

AI - Economy Execution -> Replacement Lumberer Controls: Allows AI to replenish workers at lumber mills.

AI - Economy Execution -> Economy Behavior Overrides: Overwritten “Lib - Economy Behavior” scripts that control unpacking econ plots.

AI - Economy Execution -> Economy Build Conditions: Scripts controlling build conditions for Econ/Expansion buying teams.

AI - Economy Execution: Contains scripts relating to the updating the “AI_CURRENT_CONSTRUCTION_SITE” marker that the AI uses to know where it can build. This set of scripts will check if the econ urgency has crossed the expansion threshold. If so, then it will check if the current construction site can no longer build before trying to set a new expansion as the current site. An arbitrary site will be chosen from the ones that are available to be built at.

It also contains scripts so that the “AI - Sequencer” team from the “AI - Initialization” .map file can buy any econ/expansion plots the AI unit’s happens to walk past.

Other .map files

Multiplayer_human.map: ???

Multiplayer_start_teams.map: Controls the starting units for each of the factions.

Music_musicscripts_single.map: Controls the music that plays during matches.

lib_end_mission.map: Controls win/defeat conditions.