

Battleline Planetwars

This is a detailed design that takes [Even Simpler Planetwars](#) and includes the modules required to make it implement most features of previous planetwars rounds. It is a planetwars with two factions that start off fighting across a wide front, with the winner being the faction that is able to push back the frontline and capture all the artefacts. It adds ranks and free ingame units to differentiate it further from normal games.

What is being attempted

This design sets out to solve two problems:

1. The turn-based structure made the ability to attack a rare and valuable resource.
2. Players of low skill had little chance to win against players of high skill.

These two problems meant that having more than a handful of highly skilled players online was not required. The lower skilled players sit on the sidelines because spending an attack would be a waste.

Battleline Planetwars is made playable by many players of varying skill by:

1. Making attacks cost nothing beyond the time investment of the players involved.
2. Granting lower skilled players bonuses when fighting against higher skilled players.

To make attacks cost nothing is not as simple as it sounds. To do so, an attack has to not use up a resource (turns in previous planetwars), hence the async nature of Battleline Planetwars. In addition, repelling an attack must not grant the defenders resources, so as to not cost the risk of feeding the enemy. The issue with this requirement is that if there is no added benefit for defending, why even defend, and if pending defences force a response then a faction that can keep launching attacks has a massive advantage.

The solution posed here is to remove the concept of attacking and defending. Players simply fight over contested planets, and if many players want to fight on a planet then they simply fight each other.

Initialisation

The galaxy setup is as follows:

1. There are two factions
2. Each faction owns almost half the planets, with a line of contested planets between them forming the battleline.
3. The contested planets start at zero dominance and have dominant faction distributed evenly.

4. Each faction has a homeworld deep in their territory with a Headquarters structure on it. This planet cannot be attacked and the surrounding planets cannot be controlled by enemy factions.
5. There are five artefacts on planets in the galaxy; one in the center and two within each of the territories of the faction. If the artefacts are taken and activated the faction wins the game. This should require a faction to own approximately 75% of the galaxy.
6. Players belong to one of two factions.
7. An active leader should be elected or otherwise set for each faction.

Global Parameters

1. Dominance cap: 100
2. Breakthrough dominance: 50

Planet Data

The galaxy is a graph with planets as vertices and the adjacency of planets as edges. Each planet has the following static parameters:

1. Map.
2. Whether it is a homeworld or artefact planet (denoted by a permanent structure).

Each planet has the following dynamic parameters:

1. A factionID (always set to a faction, never neutral) called the **dominant faction**.
2. An integer from 0 to the dominance cap (100) inclusive, called **dominance**.
3. A list of structures that exist on the planet. See the section on structures.
4. One **strategic priority** value per faction, an integer ranging from 1 to 10. (default 5)

Planets have the following derived parameters used throughout this document:

1. A planet is **controlled** by a faction if the faction is the dominant faction and has dominance equal to the dominance cap (100).
2. A planet is **contested** by a faction if it is not controlled by any faction, and if the faction is the dominant faction or the faction controls an adjacent planet.

Conquering Planets

Factions fight to gain or lose dominance on planets, eventually gaining control of planets. This section covers what happens when a faction gains dominance to the point that it captures a planet. Dominance gain and its other effects of battles are covered in later sections.

A planet can become controlled in one of two ways.

1. Its dominance reaches the dominance cap (100).
2. It is contested by only one faction, i.e., its dominant faction is also the dominant faction on all adjacent controlled planets.

When a planet becomes controlled, the following updates occur.

1. Contest adjacent planets.
2. Update for secondary effects.

Step 1: Contest adjacent planets

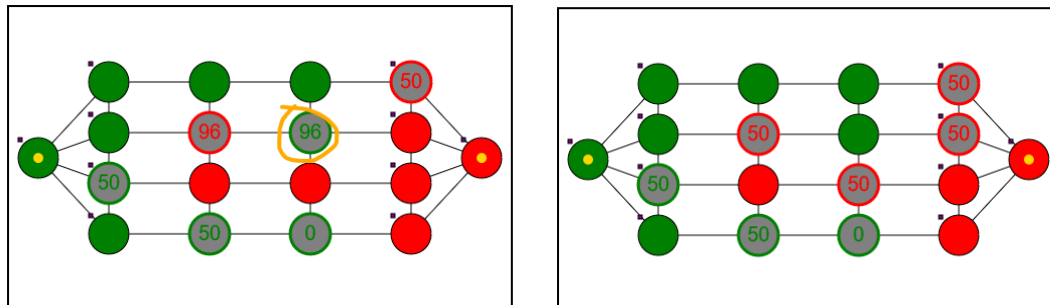
Every planet adjacent to the newly-controlled planet that is an enemy of the dominant faction of the newly-controlled planet (i.e. does not have the same dominant faction) with dominance greater than the breakthrough dominance (50) has its dominance set to the breakthrough dominance (50).

- This causes controlled planets to no longer be controlled, ensuring that controlled planets of different factions are never adjacent.

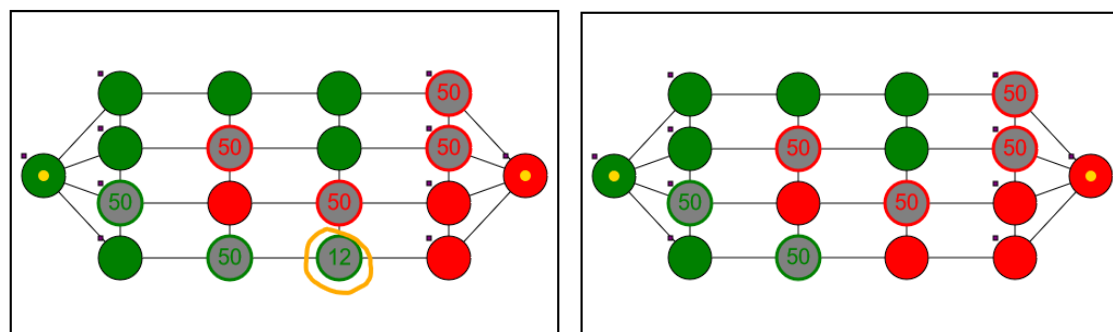
Step 2: Update for secondary effects

Recursively check whether nearby planets are contested by only one faction. This sets the planet to be controlled and carries out step 1 and 2 of conquering planets.

Examples



Increasing the dominance of the circled planet to 100.



Red gaining 13 dominance on the circled planet controls it, due to the lack of adjacent planets controlled by green.

Gaining and Losing Dominance

Factions only gain or lose dominance on planets as the result of battles.

Doing Battle

Players click “Play Planetwars” and can optionally select planets to prioritise by clicking on them. They can also select whether to be considered for vs. AI battles. This is essentially a matchmaker queue.

Every 10 minutes, reliably by the clock (at 0:00, 0:10, 0:20 etc), the queue is checked for battle creation. If a faction has at least two people in the queue then everyone in the queue receives a ready popup. Those that are ready are sorted into 2v2, or 3v3 games against each other, provided that at least two players from a faction are ready. Let N be the number of players from the faction with the fewest players queuing. The first N players of the larger faction, sorted by queue time, are selected and balanced into 2v2 and 3v3 games against the other faction (preferring 2v2). If there are at least two players from the larger faction that did not make it into a PvP game that have ticked “be considered to AI battles”, then the leftover players with this option ticked AI battles are sorted into 2 or 3 player-vs-AI games.

The battles occur on contested planets according to the strategic priority set by the War Officials and the preferences set optionally by the people in the queue (set by clicking on planets). A faction's priority for a planet is the sum of its strategic priority (an integer between 1 and 10) and the rank of the players of the faction in the queue that have selected it in their preferences.

When PvP battles are created the matchmaker selects the highest priority planets, alternating between factions. The faction that receives ‘first pick’ is selected at random. When vs. AI battles are created the planets are picked according to the faction's priority, ignoring planets already selected for PvP battles. Each planet is only picked once by the matchmaker unless we somehow run out of planets, at which point it wraps around and picks by priority again.

Battle Result

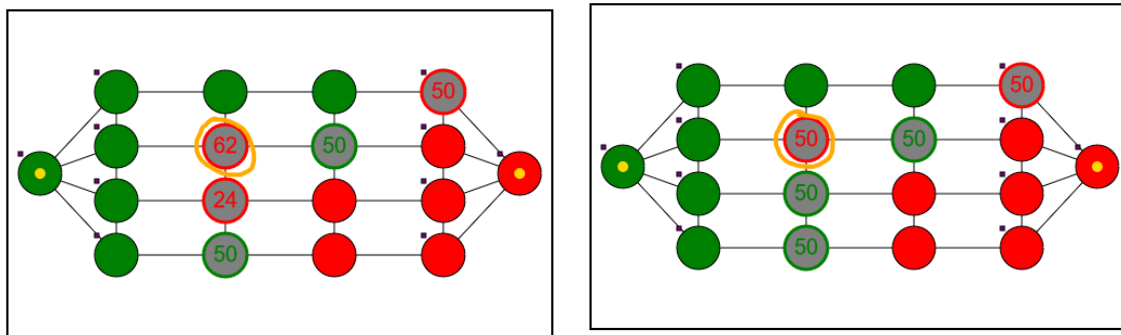
When the battle ends, both factions gain metal and the winning faction can cause a change in dominance, provided that the winning team has at least one non-AI player. If a planet is no longer contested when a battle ends, then the change in dominance is applied to the adjacent planet with the lowest dominance (among those which can gain dominance). If there is no such planet then no dominance change occurs.

Metal Gain

Each faction receives $130 - 5 * \text{BattleDistanceToHomeworld}$ metal, to a minimum of 100 metal. The metal received by each faction can be further modified by the events that occur in the battle. This is covered in the section on ingame planetwars structures.

Dominance Gain

Dominance is gained by the winner of the battle provided that there is a path in the galaxy graph from the battle-planet to the homeworld of the winning factions, such that the internal vertices of the path are planets dominated by the winning faction. If no such path exists, then no dominance change occurs.



Red can gain dominance for a victory on the circled planet in the galaxy on the left, but not the galaxy on the right.

If the dominant faction gains dominance, then their dominance increases to a maximum of 100. If a non-dominant faction gains dominance, then the dominance of the dominant faction reduces by that amount. If dominance would go negative, then the faction that gained the dominance becomes the dominant faction, with dominance on the planet equal to the underflow. Planets at zero dominance retain their old dominant faction (to avoid edge cases with uncontrolled planets). Dominance for two factions acts like a scale from -100 to 100, but should not be implemented as such because the system-as-written extends easily to galaxies with more than two factions.

The amount of dominance gained by the winner active structures on nearby planets as well as a few other factors. The full calculation is as follows:

- The base dominance gained is 12.
- Add the rank of the highest ranked player on the winning team (an integer ranging from 1 to 8). The rank check should not count players who resigned early or dropped (perhaps with a grace time of about a minute) to disincentive people from leaving won battles early.
- Add 2 if the winning faction has an active Wormhole on an adjacent controlled planet.
- Add 3 if the winning faction has an active Improved Wormhole on an adjacent controlled planet.

- Subtract 2 if the losing faction has an active Wormhole Inhibitor on an adjacent controlled planet.
- Multiply the total by 0.75 and round down if the winning team had their ingame Command Center structure destroyed.

Rank and Balance

The rank and match balance system attempts to address the issue of top players being served victory after victory with little challenge. It also creates a system for advancement within planetwars and bragging. The ideal of this system is for arbitrary teams of players to have a 50% win chance against each other due to the injection of ingame bonuses, and for everyone to be content with this state of affairs.

Rank

The rank system is meant to be as understandable as possible because people will try to manipulate it. Instead of aiming to fully remove manipulation, as with previous PW rating systems, this system accepts that some amount of manipulation will occur. Point 4 is the only nod towards trying to make the system converge rapidly.

1. Players have a rank ranging from 1 to 8. They start at rank 1.
2. Players have an amount of progress towards their next rank ranging from 0 to 8. They start at 4.
3. If you win a game your progress increases by 1, lose and it decreases by 1.
4. If you win and have won your last three games your progress increases by an additional 1.
5. If your progress reaches 8 then, you rank up and your progress is reset to 4.
6. If your progress hits 0, then you rank down and your progress is reset to 4.
7. The ranks can be displayed ingame, and possibly on the site, with a variation on the current eight rank symbols.

AI Games

The rank system is modified slightly in the case of AI games.

- Win streaks (see point 4) are tracked separately for games against AI-only teams and games against players.
- Losses against AI-only teams do not reduce progress (losses are essentially ignored).
- A game against an AI-only team is only considered to be a victory for the purpose of rank gain (see points 3 and 4) if the game takes less than 15 minutes.
- Players of rank 5 and above do not gain progress from games against AI-only teams.

Effects of Rank

High rank makes battles harder and the rewards greater.

1. Ingame, each allyTeam receives an income of **tactical support** equal to $(24 + \text{structureMod}) * (\text{enemyRankSum} + 3) * (\sqrt{\text{gameMinutes}/2} - 0.75)$, to a minimum of zero, spread over each minute (with the first minute of the game being minute zero).
2. As written in the "Battle Result" section, the dominance change caused by the winning faction is increased by having a highly ranked player on the winning side. The greater rank adds 8 dominance, the lowest adds 1.

Per-second tactical support income over each minute when fighting against teams of various summed ranks.

Minute	2	6	10	14	18	22
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0.5	0.9	1.3	1.7	2.1	2.5
3	0.9	1.7	2.5	3.2	4.0	4.7
4	1.3	2.4	3.5	4.5	5.6	6.6
5	1.7	3.0	4.3	5.7	7.0	8.3
6	2.0	3.5	5.1	6.7	8.2	9.8
7	2.2	4.0	5.8	7.6	9.4	11.2
8	2.5	4.5	6.5	8.5	10.5	12.5
9	2.7	4.9	7.1	9.3	11.5	13.7
10	3.0	5.3	7.7	10.1	12.5	14.9
11	3.2	5.7	8.3	10.8	13.4	16.0
12	3.4	6.1	8.8	11.6	14.3	17.0
13	3.6	6.5	9.4	12.2	15.1	18.0
14	3.8	6.8	9.9	12.9	15.9	19.0
15	4.0	7.2	10.3	13.5	16.7	19.9
16	4.2	7.5	10.8	14.1	17.5	20.8
17	4.3	7.8	11.3	14.7	18.2	21.7
18	4.5	8.1	11.7	15.3	18.9	22.5
19	4.7	8.4	12.1	15.9	19.6	23.3
20	4.8	8.7	12.5	16.4	20.3	24.1

Cumulative tactical support received at the end of each minute when fighting against teams of various summed ranks.

Minute	2	6	10	14	18	22
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	30	54	78	102	126	150
3	87	157	226	296	365	435
4	167	300	433	567	700	833
5	266	480	693	906	1,119	1,332
6	384	692	999	1,306	1,614	1,921
7	519	934	1,349	1,764	2,179	2,594
8	669	1,204	1,739	2,274	2,809	3,344
9	833	1,500	2,167	2,833	3,500	4,167
10	1,012	1,821	2,630	3,440	4,249	5,058
11	1,203	2,166	3,128	4,090	5,053	6,015
12	1,407	2,533	3,658	4,784	5,909	7,035
13	1,623	2,921	4,220	5,518	6,816	8,115
14	1,850	3,331	4,811	6,291	7,772	9,252
15	2,089	3,760	5,432	7,103	8,774	10,445
16	2,338	4,209	6,080	7,951	9,822	11,692
17	2,598	4,677	6,756	8,834	10,913	12,992
18	2,868	5,163	7,458	9,752	12,047	14,342
19	3,148	5,667	8,185	10,704	13,222	15,741
20	3,438	6,188	8,938	11,688	14,438	17,188

Smurfing

Smurfing is encouraged by the addition of tactical support for the opposing team. To counteract this we may need to add some strict restrictions on planetwars. The following limit could work:

1. Be a steam-linked account of level at least 2.
2. Be a non-steam-linked account of level at least 6.

Tactical Support

Lore-wise, the faction sends greater tactical support into battle against highly ranked enemy commanders, to help take them down. This is an ingame resource that may be spent to spawn free units.

Distribution

The tactical support gained by an allyTeam is distributed evenly between the players on the team. If there are no players on a team, then a gadget will automatically select units and spend tactical support for the allyTeam.

Spending

Tactical support is spent with an ingame UI for displaying the support and placing it on the map. It can be spent on:

1. A limited selection of free units from space. Click on a unit in the UI and click on the map. Can only be spawned near allied metal extractors.
2. Special abilities such as offmap tacnukes from space.
3. Sending tactical support quota to players on your allyTeam, for cases where a team wants to pool resources to buy something big.

Some specifics:

1. Expenditure on any single tactical support option is capped by the total support received by the ally team, divided by the size of the allyTeam. This prevents pooling with Option 3 being OP.
2. An initial list of spawnable units could be all land and sea combat units.
3. Tactical support abilities are globally visible, with space units being visible while they drop. The enemy's stockpile of tactical support, total support gained, and expenditure cap is on the UI.

Galaxy Structures and Economy

Players build structures on planets with the metagame resource called **metal**. Factions gain the benefits of the structures on all their controlled planets. An economic turn occurs every hour, on the hour. When a turn occurs, the powering-up structures gain activation progress and active

structures apply their effects. Many structures apply effects to battles and all of these effects, including modifiers to the dominance calculation, are calculated based on the status of the structures and economy at the start of the battle.

Structure Data

1. Structure type.
2. Energy priority - Whether the structure wants to be activated, and its priority for taking energy.
3. Activation time - A number of turns (hours) that have to pass before the structure is activated.
4. Repair requirement (0% to 100%) - Whether a structure requires repair and how much it costs.

Metal, Construction, and Repair

Players gain 100 metal for participating in a battle. Structures can be built on any controlled planet. A structure that requires repair must be repaired for that proportion of its metal cost before it is used, and it still takes the usual amount of time to power up. Structures cannot be deleted manually. If a structure reaches 100% repair cost it is deleted from the planet. In the case of the Artefact, the repair requirement is capped at 100% because it cannot be deleted.

Structures gain repair cost while planets are contested. Whenever the dominance of a planet drops lower than it has dropped since the planet was last controlled, all structures on the planet gain repair requirement equal to half the difference between the old and new minimum dominance. If the planet's dominant faction changes, then treat the dominance as dropping to zero. In this way, structures gain 50% repair requirement from being contested on a planet that switches control from one faction to the other.

The activation time of a structure can be skipped by paying its metal cost. This causes it to activate on the next economy tick. Structures that require repair must still be repaired before being rush-activated.

Effects

1. Produce energy. Most structures drain energy, going offline and taking a number of turns to power up if their energy supply is interrupted. Energy producers produce the required energy. Metal can possibly be paid to rush the power up process.
2. Modify battle dominance. Structures can make battles fought on adjacent planets yield more dominance for the faction or less for their opponent.
3. Modify tactical support. This can be done by modifying structureMod in the tactical support income equation.

4. Modify breakthrough dominance. A structure can resist some of the effects of a breakthrough, mitigating some of the dominance loss and making the planet easier to return to control.

The effects of structureMod and dominance changes from multiple copies of the same structure from multiple planets do not stack.

Structure List

The only major change to the following list of structures is their galaxy effects. Artefacts take a full day to power up to give players a chance to retake them. Victory will likely require holding beyond the artefacts.

Name	Cost	Activation	Power	Galaxy Effect
Power Generator Unit	100	2	-	Produces 50 energy
Orbital Solar Array	275	3	-	Produces 100 energy Never requires repair, cannot be destroyed
Planetary Geothermal Tap	625	6	-	Produces 250 energy
Wormhole Generator	150	3	0	+2 allied dominance effect in adjacent battles. Every planet starts with one of these.
Improved Wormhole	250	4	80	+3 allied dominance effect in adjacent battles.
Wormhole Inhibitor	300	3	150	-3 enemy dominance effect in adjacent battles.
Field Garrison	200	3	120	+1.2 structureMod in adjacent battles. Set breakthrough dominance to 60 on the planet.
Interception Network	250	4	160	-1.2 enemy structureMod in adjacent battles.
Dropship Factory	400	6	150	+1.2 structureMod in battles on target planet up to three planets away. Cannot change target for an hour after target is set.
Bomber Factory	500	6	180	Add offmap bombardment tactical support options to target planet up to three planets away. Cannot change target for an hour after target is set.
Planetary Defense Grid	600	6	240	Set breakthrough dominance to 85 on the planet.
Warp Gate	1000	6	120	Target any planet to grant +2.4 structureMod for battles started on the planet, starting immediately and ending in 20 minutes. Deleted after use.
Artefact	500	24	300	Win the game if all activated. Cannot be deleted.

Headquarters	NA	-	-	Marker for the homeworld of each faction. Dominant faction cannot be changed on adjacent planets (instead of changing, dominance is set to 0).
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Ingame Planetwars Structures

Structures apart from the Headquarters (which cannot be attacked) and the Orbital Solar Array (which cannot be destroyed) exist ingame and can be used, saved and destroyed in much the same way as in previous rounds of planetwars. The dominant faction when the battle starts, called the **defender**, controls the structures and they spawn on their side of the map. The other faction is the **attacker** and may destroy the structures.

Command Centers

Each side has a command center. If the faction that loses the battle manages to destroy the enemy command centre, then the dominance change is reduced to 75% of what it would otherwise be, rounded down.

Killing and Saving Structures

A structure is **destroyed ingame** its planetwars structure is killed during the battle, or if the dominant faction was defeated and did not rescue it with the Wormhole's ability to teleport a structure to safety.

Destroying a structure ingame has the following effects:

1. The structure cannot be repaired for three hours after the battle ended. This delays anyone activating the structure if the planet is controlled in the near future. This effect is not applied if the planet is no longer contested when the battle ends, before applying the dominance from the result of the battle.
2. The attacking faction gains 3% of the structure's cost in additional metal at the end of the game, to a maximum of 50 extra metal gained.
3. The structure gains 2% repair requirement.
4. The defender loses 1% of the structure's cost from their metal at the end of the game, to a maximum of 20 metal lost.
5. The extra metal gains and losses are first summed then rounded down.

If a planet changes dominant faction, then it cannot be repaired for three hours after the battle ended. This removes the motivation for the defending side to destroy their own structures to gain this effect.

Faction Roles

Players are able to take on roles within their faction to set the strategy and direction. Each faction has a more-flavourful version of the following roles:

- Leader
- Head of Economy
- Economy Official
- Head of War
- War Official
- War Grunt

Leaders and Heads

- The leader and heads of a faction are the only roles that may only be filled by one person.
- The leader of the faction has all powers and can appoint and recall all roles.
- The heads of economy and war have all the economy and war powers respectively. They can appoint and recall their subordinate officials and grunts.
- Members of the faction can nominate themselves to become the leader of the faction, and after a period of voting may replace the leader if they have enough votes.
- In addition, the leaders and heads of a faction can control the secret texts and topics of the faction.

Economy Powers

The head of economy and the economy officials have 100% metal quota and can control energy priorities. Players without 100% metal quota are only given metal quota equal to the metal they personally generate by playing battles, divided evenly among the players from their faction in the battle. A normal player can only spend as much of the faction's metal as they have metal quota, and their metal quota is spent as well.

The head of economy and the economy officials can also change the activation of structure and set energy priorities.

War Powers

The head of war and the war officials can control all targeted abilities on structures (Warp Gate, Bomber Factory, Dropship Factory). In addition, they can set the strategic priority of each planet for their faction, which is a hidden value that each faction can set per planet.

The strategic priority of a planet is visible to members of the faction and gives a hint as to where they should play their battles. The ingame planet view shall have a big "Play Planetwars" button that results in casual players playing on planets according to the strategic priority.

War grunts just get precedence for control of ingame planetwars structures. If the owner of a planet is in the game then they control the structures. If the owner is not present then role is used to determine ownership, in the order Leader, Head of War, War Official, then War Grunt. Ties are broken by rank, and then broken randomly.

Planet Ownership

Players can 'own' planets. This displays them as the owner and gives them control of planetwars structures on battles in that planet.

Homeworlds

The faction leader always owns the homeworld. It does not count against any other ownership limits laid out in this section.

Gaining Ownership

If a player wins a battle and they own fewer than $\text{floor}(\text{rank}/3)$ planets, they gain ownership of the closest unowned controlled planet of their faction. This check is done after they gain rank as a result of the battle. If there are no unowned planets then they check whether any players own more than $\text{floor}(\text{rank}/3)-1$ planets and take one of their planets.

Losing Ownership

Ownership can be taken from you if your rank drops two ranks below the rank required to keep a planet, as in section above. Ownership is also lost when a planet becomes controlled by an opposing faction.

Ownership Powers

Players can buy any structure placed on their planet, sending metal quota to the seller. Players can set the target parameters (Dropship, Bomber, Warp Gate) of structures they own.

Simplifications

The following simplifications can easily be made if some aspects are too technically challenging.

1. Warp Gate does not need to exist.
2. Dropship Factory and Bomber Factory do not need to exist.
3. Offmap artillery (bomber factory) especially does not need to exist.
4. Dropship Factory and Bomber Factory could give a bonus in a radius of two planets instead of being a targeted ability.
5. Strategic priority does not need to exist, but then War Officials run out of things to do and it becomes hard to organise your players that are playing less attention.
6. The repair system probably doesn't need to exist, but it is good to have a metal sink.
7. The HQ metal system does not need to exist, but it is already implemented.

Incomplete lists of changes

Changes required for the infrastructure:

1. Influence Points is replaced by the concept of dominance and dominant faction.
2. IP decay and spread is removed.
3. Planets are always considered to be adjacent to each other if they have a link.
Wormholes do not change any adjacency tests.
4. The economy needs to tick every hour.
5. Battles are started with a more matchmaker-like system than the previous system.
6. Player ranks, progress and AI/non-AI winstreaks need to be kept track of and updated.
7. Player ranks need to be communicated ingame.
8. Paying metal for repairs needs adding.
9. The bomber and dropship factories target planets within a certain distance.
10. Planetwars games need padding with AI opponents.
11. War Officials need the ability to set strategic priority on planets.
12. Send the lobby the information required to display a nice galaxy map.
13. Disable references to diplomacy.
14. Enter the modified stats and galaxy abilities for the planetwars structures into the database.

Changes required for the lobby:

1. Make planet selection more matchmaker-like.
2. Display a nice galaxy map.
3. Add a button to automatically play planetwars based on the priorities set by the War Officials.

Changes required for the game:

1. Create a tactical support income system and UI.
2. Create orbital drop spawned units.

3. Create some orbital bombardment abilities
4. Create a modoption and interface that allows players to take control of allied AI units.
Some people will prefer to play for the AI and it seems like a source of frustration to not let them do so.