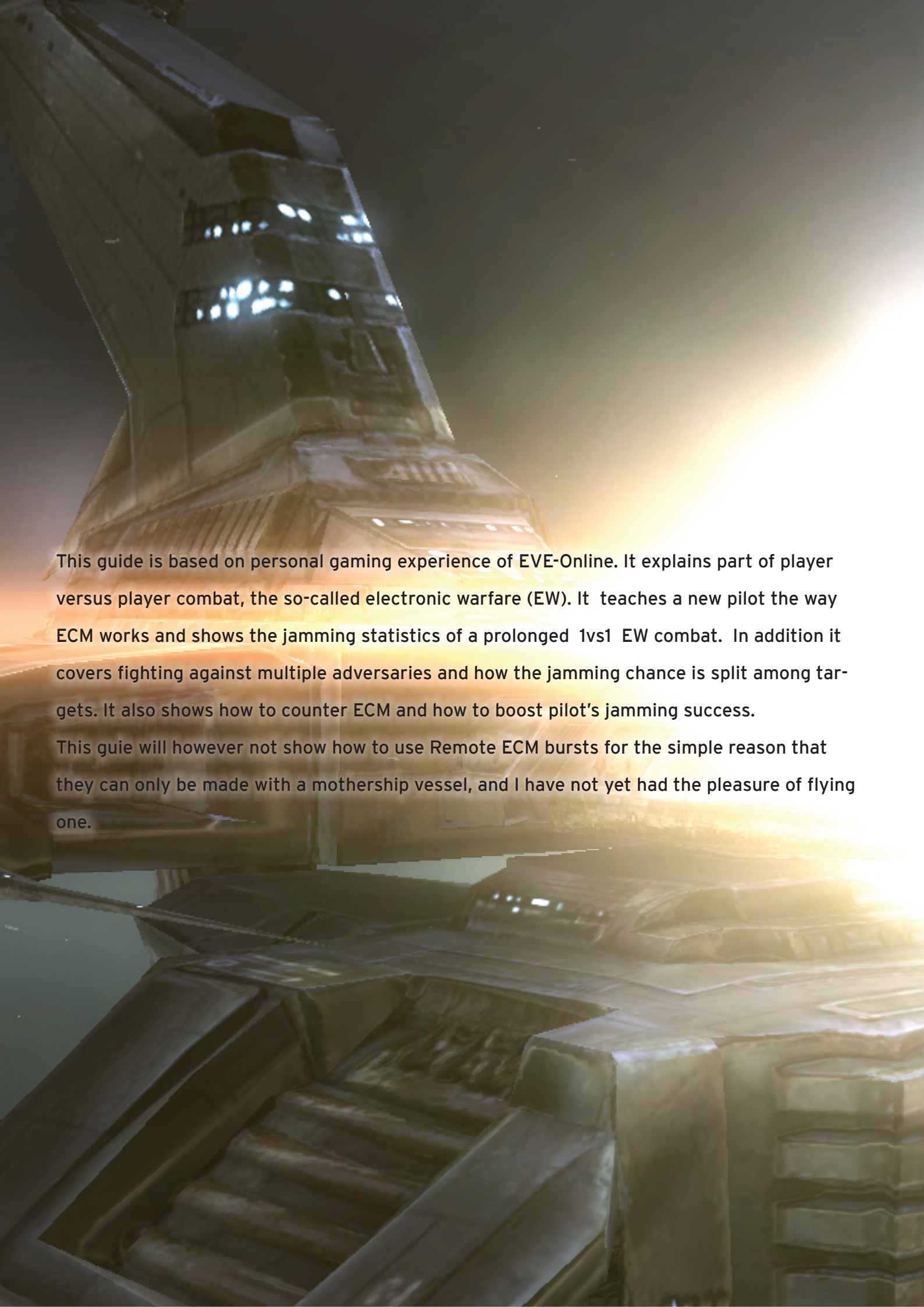# JAMMING PROBABILITIES v2.1
- A COMPLETE GUIDE TO ECM -

by Virgo I'Platonicus

june 2008

This guide is based on personal gaming experience of EVE-Online. It explains part of player versus player combat, the so-called electronic warfare (EW). It teaches a new pilot the way ECM works and shows the jamming statistics of a prolonged 1vs1 EW combat. In addition it covers fighting against multiple adversaries and how the jamming chance is split among targets. It also shows how to counter ECM and how to boost pilot's jamming success.

This guie will however not show how to use Remote ECM bursts for the simple reason that they can only be made with a mothership vessel, and I have not yet had the pleasure of flying one.

A maniacal scream overwhelmed the local channel as the next six torpedoes ripped into the Scorpion's structure. Bane knew that he could not win, and that he would not live to see either of his betrayers perish before himself. Uncontrollable fires swept across his battleship as it pitched and yawed in a futile effort to remain steady. The next volley of torpedoes, harbingers of death already in flight, would be the last. Otro watched their bright contrails arc through the blackness, reluctantly accepting the ruthless choice that fate had imposed on him. My soul will agonize over this for as long as I live, Otro thought before giving his answer to Fatal:

"No..."

The battered Scorpion shuddered for a moment, then disintegrated in an epic explosion as the torpedo warheads found the battleship's reactor core. A single pod, visible on Otro's sensors for just a fraction of a second, was caught in the shockwaves of the final detonations and broke apart. Bane's corpse, part frozen, part carbonized, floated among the mangled debris. The Raven was victorious.

-excerpt from "Ruthless", an EVE-Online novella by Tony Gonzales

I bet you wished in those dying moments of yours, Bane, that you had that Scorpion class battleship with Electronic Countermeasures fitted instead...

- Virgo I'Platonicus, unknown pilot

More than 2 years ago I published a "Jamming probabilities guide" -

(http://myeve.eve-online.com/ingameboard.asp?a=topic&threadID=257209),

which has since become obsolete. I have included calculations there that have

made the reading difficult and understanding what you had read even more so.

While the computations published there are still correct, the default settings

behind it have changed.

New ships have entered our EVE-Online gaming experience, ECM modules

have been changed in the way they work as well as in their base strengths.

Gang modules that affect ECM have been introduced and ECM drones along

with them. The player base has jumped from 70 thousand to 200 thousand+

since the previous guide.

Thus the need for a new guide arose and you are reading it at the moment.

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PROLOGUE

Electronic countermeasures (ECM) are a subsection of electronic warfare which includes any sort of electrical or electronic device designed to trick or deceive radar, sonar, or other detection systems like IR (infrared) and Laser. It may be used both offensively or defensively in any method to deny targeting information to an enemy. The system may make many separate targets appear to the enemy, or make the real target appear to disappear or move about randomly.

    - Wikipedia

In EVE, ECM is simply a module that, if successful, prevents an enemy to make any target locking whatsoever for 20 seconds, leaving him the only options to flee or wait and try again in a few seconds.

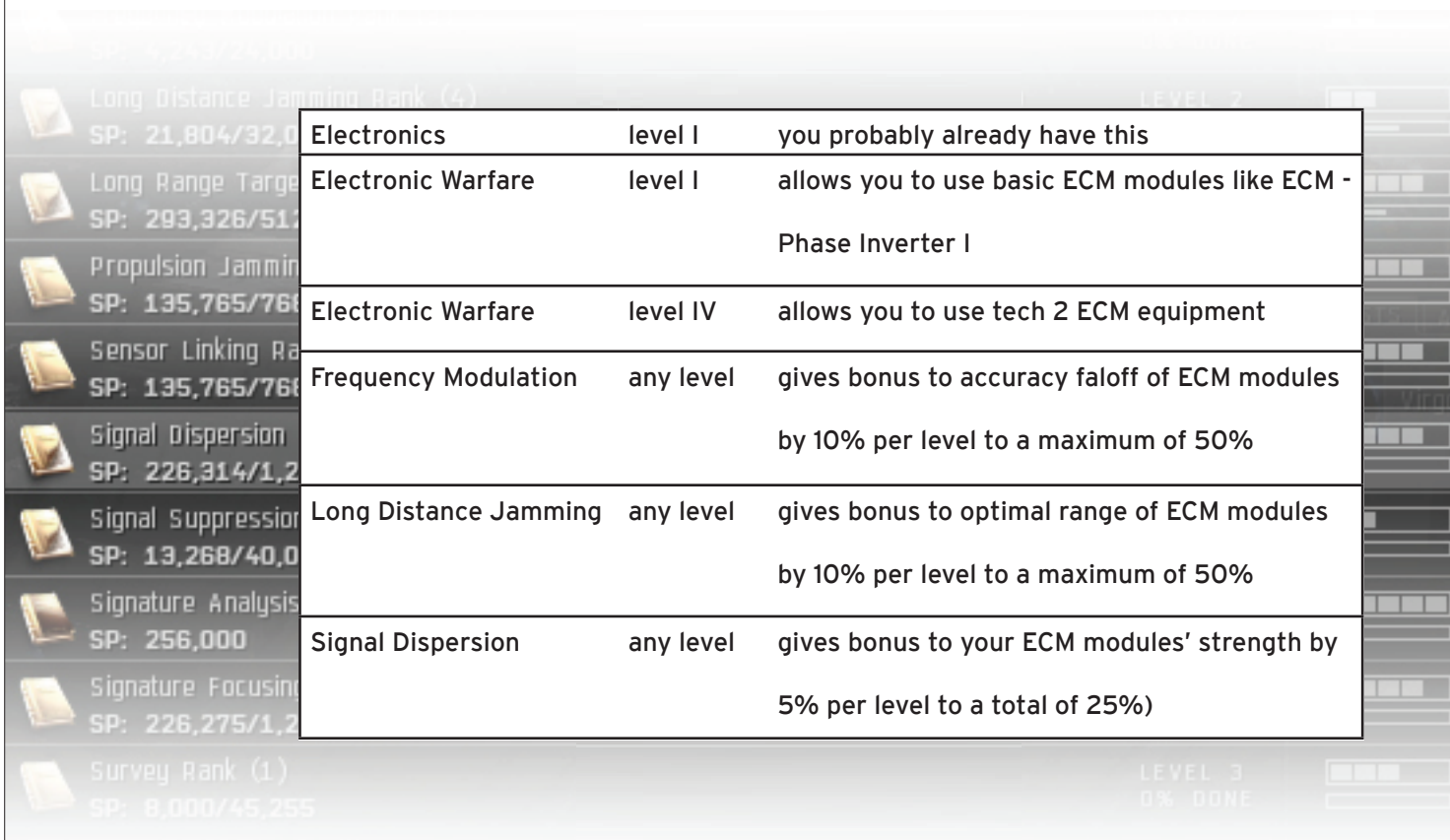The system may sound simple and the results promising, however life and EVE teach us otherwise.

BASICS

It takes very little time and effort in order to become an ECM capable pilot. A few skills, a ship and an ECM module or two. And it really is quite that simple.

SKILLS

Skills that you need in order to become ECM capable:

Electronics	level I	you probably already have this	
Electronic Warfare	level I	allows you to use basic ECM modules like ECM - Phase Inverter I	
Electronic Warfare	level IV	allows you to use tech 2 ECM equipment	
Frequency Modulation	any level	gives bonus to accuracy faloff of ECM modules by 10% per level to a maximum of 50%	
Long Distance Jamming	any level	gives bonus to optimal range of ECM modules by 10% per level to a maximum of 50%	
Signal Dispersion	any level	gives bonus to your ECM modules' strength by 5% per level to a total of 25%)	

There is no need to say that a true ECM pilot needs all these skills at level 5. If you took care of your learning skills and have at least some implants so that your memory/intelligence attributes reach the numbers 20 and above, it should take you 45-60 days to have all these skills at level 5.

BASICS - CONTINUED -

MODULES

Modules that you need are of different types. Some are fitted to med slots, some to low slots and some are fitted as rigs a.k.a. ship modifications.
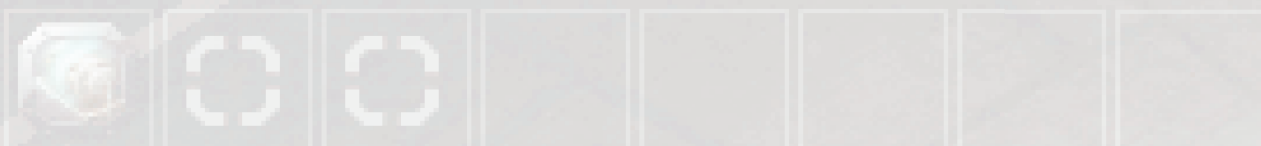
MEDIUM SLOTS

On your medium slots you fit the so called ECM modules. These are the actual modules that you activate in combat to jam your target. They can be race specific or omnirace directed or can even work only in certain radius around you without the need to lock your target.

Race specific	Name	Sensor type	Version types
Caldari jammers	ECM - Spatial destabilizer	gravimetric	I / II / named /faction
Minmatar jammers	ECM - Phase Inverter	ladar	I / II / named / faction
Gallente jammers	ECM - Ion Field Projector	magnetometric	I / II / named / faction
Amarr jammers	ECM - White Noise Generator	radar	I / II / named / faction
Omni jammers	ECM - Multispectral Jammer	all	I / II / named / faction
	ECM Burst	all	I / II / named / cosmos

Note the difference. The "racial" jammers give 3 (tech I) and 3.6 (tech II) points of jamming strength when jamming the "correct" race and one third of that (1/1.2points) to incorrect race jamming strength. The multispectral jammer has the strength of the difference between correct and incorrect race modifiers(2/2.4 points for tech I and tech II respectively).

ECM Bursts do not work with current game mechanics as intended. They work inside 5-6km radius from your ship, affecting everything (chance based), but are not as effective as they should be. Drones that are attacking you usually do not drop locks, so it is a bit pointless to fit them today.

Basics - continued -

Modules
Low slots

A pilot can fit to his low slots certain modules that enhance the working of his medium slot ECMs. These modules are called

Signal Distortion Amplifier (SDA) versions I / II / named

and give 20% bonus (for techII variant) to ECM modules' strength that are fitted to the ship. Stacking penalty applies to them which means that the more modules of the same type that you fit, the less their relative cumulative strength is (relative maening total cumulative strength divided by the number of modules that are giving desired bonus). Effectively fitting more than 4 modules is useless and you will not need even that many as you will see later on.

Ship modification slots

You can choose between two different Electronics superiority rigs, that will enhance your ECM modules. Fit them to rigging slots:

Particle Dispersion Augmentor	I / II	enhance the strength of ECM modules by percentage (PDA)
Particle Dispersion Projector	I / II	enhance the optimal range of ECM modules by percentage (PDP)

PDA I gives a 10% bonus to ECM strength (15% for TechII) and PDP I gives 10% (15% for TII) to bonus range of ECM modules.

The logical solution to fitting would be to go straight for the heighest possible jamming strength with tech II modules or better spiced up with tech I rigs. It turns out that because of stacking penalty fitting PDA rigs is pointless. Tech II SDAs give 20% bonuses compared to tech I rigs that give 10% (tech II rigs are so expensive that they're usually not a viable consumer/pirate's option and even so they only give 15% bonus to jamming strength which is still less then the low slot counterpart). This means that it may be better to fit the modification slots with some other rigs that complement your ship in other ways. In my opinion the best solution would be to fit 2 SDA IIs and try get into fleet with somebody who has perfect information warfare skills and an information warfare mindlink. He will give you 22% or 25% (if in Eos ship with Command ship skill @ level 5) bonus to ECM strength (plus other bonuses) giving you a total bonus that will be higher if you have less jamming strength amplifying modules fitted because of stack penalty. If you have 2 or 3 SDAs and 2 PDAs then his gang bonus will be virtually nonexistant. Put something better to other low and rig slots.
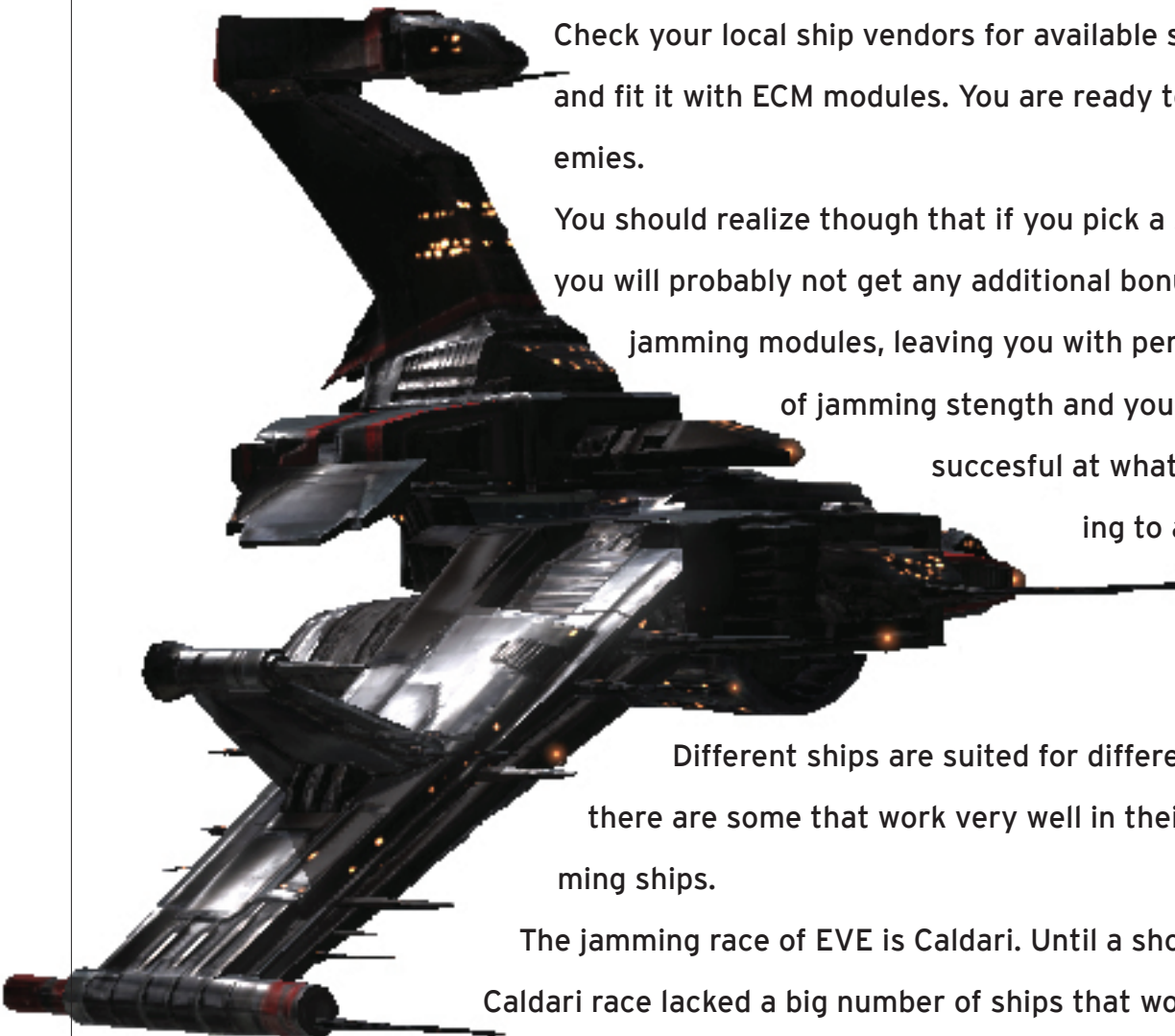
Check your local ship vendors for available ships. Pick any and fit it with ECM modules. You are ready to jam yor enemies.

You should realize though that if you pick a ship at random, you will probably not get any additional bonuses for your jamming modules, leaving you with perhaps 4 points of jamming stength and you will not be very succesful at what you will be trying to achieve.

Different ships are suited for different roles, and there are some that work very well in their role as jamming ships.

The jamming race of EVE is Caldari. Until a short time ago, the Caldari race lacked a big number of ships that would be really useful and successful in PVP. That changed when Revelations 3 (3.1) patch hit Tranquility server. It boosted their ships and gave them new ones to play with.

So, techincally you can use ECM modules with a ship of any race, but caldari have some that have really nice bonuses for ECM.

Descriptions follow ordered by size and skill requirements:

BASICS - CONTINUED -

SHIPS

FRIGATE

Shipclass: Griffin

Special ability: 15% bonus to ECM Target Jammer strength and 10% bonus to ECM Target Jammers' capacitor need per Caldari Frigate level.

Comment: maxed with one level 5 skill with 75%, 50% bonuses. 4 medium slots. Beginner's ship, 0.1 million isk - cheap.

ELECTRONIC ATTACK SHIP

Shipclass: Kitsune

Special ability: Caldari Frigate Skill Bonus: 20% bonus to ECM target jammer strength and 10% reduction in ECM target jammers' capacitor need per level.

Electronic Attack Ships Skill Bonus: 10% bonus to ECM target jammer optimal range and 5% bonus to capacitor capacity per level.

Comment: maxed with two level 5 skills with 100%,50%,50%,25% bonuses. 5 medium slots. Lovely ship. Approximately 12 million isk.

SHIPS

CRUISER

Shipclass: Blackbird

Special ability: 15% bonus to ECM Target Jammer strength and 20% bonus to ECM Target Jammer optimal range per skill level.

Comment: maxed with 1 level 5 skill with 75%,100% bonuses. 6 medium slots, 3 million isk.

FORCE RECON SHIP

Shipclass: Falcon

Special ability: Caldari Cruiser Skill Bonus: 10% reduction in ECM Target Jammer capacitor use and 20% bonus to ECM Target Jammer optimal range per level. Recon Ships Skill Bonus: 20% bonus to ECM Target Jammer strength and -96% to -100% reduction in Cloaking Device CPU use per level Role Bonus: 80% reduction in liquid ozone consumption for cynosural field generation and 50% reduction in cynosural field duration. Note: can fit covert cynosural field generators.

Comment: maxed with 2 skills at level 5 with bonuses 50%, 100%, 100%, 100%, 80%. 7 medium slots, approximately 70 million isk. Bukah.

COMBAT RECON SHIP

Shipclass: Rook

Special ability: Caldari Cruiser Skill Bonus: 10% reduction in ECM Target Jammer capacitor use and 20% bonus to ECM Target Jammer optimal range per level. Recon Ships Skill Bonus: 20% bonus to ECM Target Jammer strength per level and 5% bonus to heavy and light missile kinetic damage.

Comment: maxed with 2 level 5 skills, with bonuses 50%, 100%, 100%, 25%. 7 medium slots and approximately 55 million isk.

Basics - continued -

Ships

Battleship

Shipclass: Scorpion

Special ability: 15% bonus to ECM Target Jammer strength and 20% bonus to ECM Target Jammer optimal range per level.

Comment: with one skill at level 5 it gives you 75%, 100% bonuses and it has 8 medium slots. Cost: 60 million isk.

Black Ops

Shipclass: Widow

Special ability: Caldari Battleship Skill Bonus: 5% bonus to cruise and siege missile launcher rate of fire and 10% bonus to cruise missile and torpedo velocity per level. Black Ops Skill Bonus: 20% bonus to ECM target jammer strength and multiplies the cloaked velocity by 125% per level. Note: can fit covert cynosural field generators and covert jump portal generators. No targeting delay after decloaking.

Comment: with 2 skills at level 5 you have 25%,50%, 100%, 625% bonuses. 8 medium slots and approximate cost of 480 million isk.

You have the skills required, you picked the ship and fitted it with ECM, low slot amplifiers and everything else including rigs.

Now let's take a look at how ECM really works.

If you look at info of your fitted ECM , you will see a tonn of statistics including among others "jamming strengths" against various races. The numbers you see are derived from the modules that you use, your skills, amplifiers, rigs and gang bonuses. What you really need to do is pay attention to what type of target you want to jam. Target's sensor strength and type are shown in its info window.

For example if you look at scorpion info, you will see "Gravimetric sensor strength: 24 points". Now take a look at your jammer's info and take notice of its gravimetric strength. It should be anywhere from 1.2 to 16 depending on the modifiers I mentioned earlier.

Take the jamming strength as your attack strength and sensor strength as target's defensive strength against jamming.

ECM is chance based. Meaning that you have from 0% to 100 % chance of jamming a ship. The succes chance is derived as:

$$chance = \frac{your\ jamming\ strength}{target\ sensor\ strength}$$

For example you have skills at level 3 and fly a blackbird. You have 3 tech 2 racial jammers , all against gravimetric (caldari) with a jamming strength of 8,94 (caldari cruiser 3, signal dispersion 3, 1 PDA, 2 SDA2s) you are about to jamm the above mentioned scorpion. Let's take a look at your chances to succesfully jamm the vessel. There are 2 ways to calculate the your success chance. 1 is straightforward, you calculate all the possible instances and sum it all up, the other to simply say (1 - "all my jammers failed at what I wanted them to do"). Let's try the latter one for now. The chance for your module to succesfully jam the scorpion is = 8,94/24 = 0,3725. That's 37,25% chance in layman's terms.

For your module to fail the chance is = (24-8,94)/24 = 0,6275 = 62,75%. Now you have 3 modules. For ALL of them to fail this number gets multipied by itself three times: = 0,6275^3 = 0,247. Now this result tells you how much chance all your 3 modules have a chance of failing. That's 24,7 %. Meaning you have 75,3% (100-24,7) chance of succesfully jamming the scorpion battleship with only 3 modules and very low skills.

If successful, target's lock will drop and there will be a 20 second countdown visible underneath target lock. When the cycle is up, the module tries again. 75% jamming chance but it can be better.

This is where I show you what jamming is capable of.

First, let's give your imaginary character a boost. Now it has signal dispersion 4, and can fly a Falcon with level 4 Recon ships skill which gives you 80% bonus to ECM strength. You will have 3 additional SDA2s and 1 PDA, giving 8,37 points of jamming strength to your multispectral jammers.

Standing next to this imaginary character is the ultimate monster in skill points, having them all at level 5. He uses the same setup as you do, the only difference being that his modules have the strength of 9,68. Not much of a difference one could say, only 1,31 points or 13,5% in strength. Let's run the math and see how much better this monster really is.

Our fictional target has the sensor strength of 24, same as the scorpion we jammed above.

This is the mathematical equation that shows the statistics of jamming:

$$W_n = \binom{Z}{N} p^N (1-p)^{Z-N} = \frac{Z!}{N!(Z-N)!} p^N (1-p)^{Z-N}$$

W_n = distribution of success chance

p = chance for 1 succesful jammer(= same as the equation on the previous page)

Z = number of of jammers that try to jam

N = number of successful jammers

When calculating jamming success rate you have to be aware that in different instances of the same example (versus scorpion) you have different ways of jamming your target and the chance to succesfully jam it is the sum of all different instances.

Jamming succes chance versus 1 target with sensor strength 24:

Number of jammers and jammings:	str 9,68	str 8,37	Comment:
1 multispec, it hits	0,403333	0,34750	5,5% difference, not much is it?
2 multispecs, 1 of them hits	0,481311	0,45425	1 ECM hits, 1 fails.
2 multispecs, 2 of them hit	0,162677	0,12162	2 ECM hit single target
2 multispecs, at least 1 hits	0,643988	0,57587	7% difference;the result is the sum of both chances from above.
3 multispecs, 1 of them hits	0,430773	0,44374	
3 multispecs, 2 of them hit	0,291193	0,23762	
3 multispecs, 3 of them hit	0,065613	0,04242	
3 multispecs, at least 1 hits	0,755859	0,70085	5,5% reaction to skill difference
3 multispecs, at least 2 hit	0,356806	0,28004	
4 multispecs, 1 of them hits	0,342704	0,38516	
4 multispecs, 2 of them hit	0,347491	0,30951	
4 multispecs, 3 of them hit	0,156597	0,11050	
4 multispecs, 4 of them hit	0,026464	0,01479	
4 multispecs, at least 1 hits	0,873256	0,82012	5% reaction to skill difference
4 multispecs, at least 2 hit	0,530552	0,43480	10% reaction!
4 multispecs, at least 3 hit	0,183061	0,12529	enormous relative reaction -
5 multispecs, 1 of them hits	0,255600	0,31367	
5 multispecs, 2 of them hit	0,345560	0,33595	
5 multispecs, 3 of them hit	0,233591	0,17990	
5 multispecs, 4 of them hit	0,078951	0,04817	
5 multispecs, 5 of them hit	0,010674	0,00516	
5 multispecs, at least 1 hits	0,924376	0,88285	
5 multispecs, at least 2 hit	0,668776	0,56918	10% difference
5 multispecs, at least 3 hit	0,323216	0,23323	
5 multispecs, at least 4 hit	0,089625	0,05333	
Let's do this a bit easier for instances with 6, 7 and 8 fitted multispectrals:			
6 multispecs, at least 1 hits	0,954878	0,92371	
7 multispecs, at least 1 hits	0,973077	0,95031	
8 multispecs, at least 1 hits	0,983936	0,96764	

#Probability of 1 means that the occurance takes place in 100% instances. Any lower number is the percent of probability(example:0,847412 means 84,7412% chance of occurance)

Be mindful that you should never think this way:

"I have 4 ECM - MS2, I have lvl 4 skills and i have 82% chance to jamm the Scorpion. If i have all other skills that are of rank 4/6/8/10 at level 5, i will only gain another 5% of strength."

Wrong. In the first instance your target has 18% chance of not being jammed. In the second instance he has 12,7 % chance of not being jammed. That's a 30%(1-12,7/18) bonus to your chance of succesfully jamming the scorpion and surviving the conflict.

One may have noticed as well that one can never reach 100% chance of jamming their target unless any one of his ECM modules has higher jamming strength than the target has its sensor strength. Having more than 5 multispectrals fitted, the chance of jamming 1 target is otherwise reaching the 100% slower and slower, never truly reaching it.

However the target's chance window of not being jammed with 8 jammers is 3,2% with 4/4 skills and 1,6% with 5/5 skills which is essentially the fat percentage in the different sorts of sold milk products in Slovenia. What I wanted to point out though is that 5/5 skills give your target 50% smaller survival window than 4/4 skills. That's a lot.

MULTISPECTRAL JAMMERS

To help you understand the numbers consider the next graph. It shows your hypothetical jamming strength on x-axis, target's hypothetical sensor strength on y-axis and your chance of jamming it on z-axis.

What you see is a 3D distribution of jamming success over 2 dimensions if a pilot is using 4 jammers with same strength. However let's rotate this graph a bit and see what it can tell us.
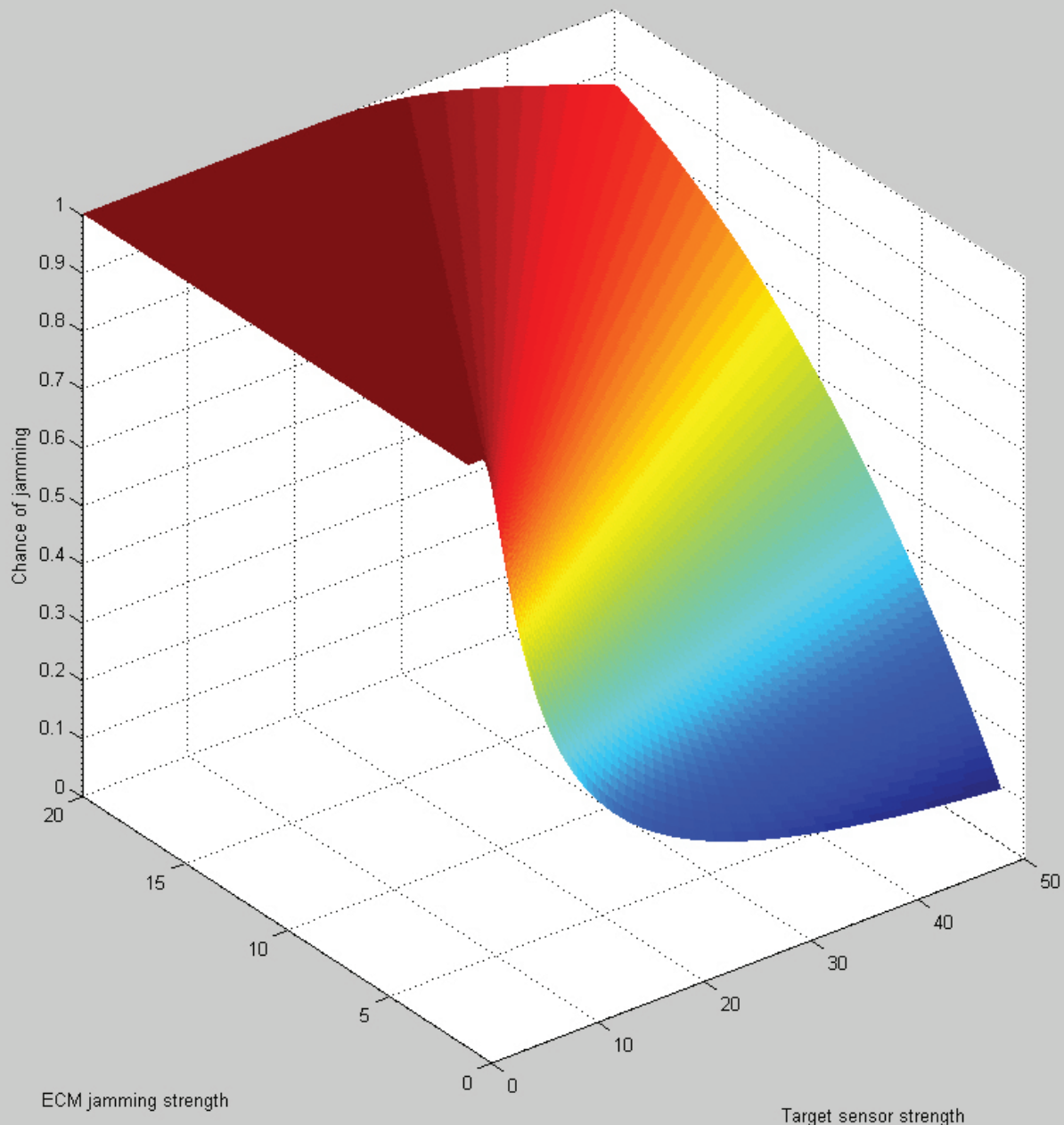
MULTISPECTRAL JAMMERS

If we take a look at previous graph from Y-Z side, the following is what we get. What you see are all the possible curves of your jamming statistics against a target with specified sensor strength. So the curve for a person with 0 skills and tech I racial ECM jamming a wrong target would be the lower limit of the colored area. A person with maxed skills and best modules would be on the curve of the highest limit of the colored area. Most EVE players are therefore somewhere in between and most likely in the lower half of the colored area.
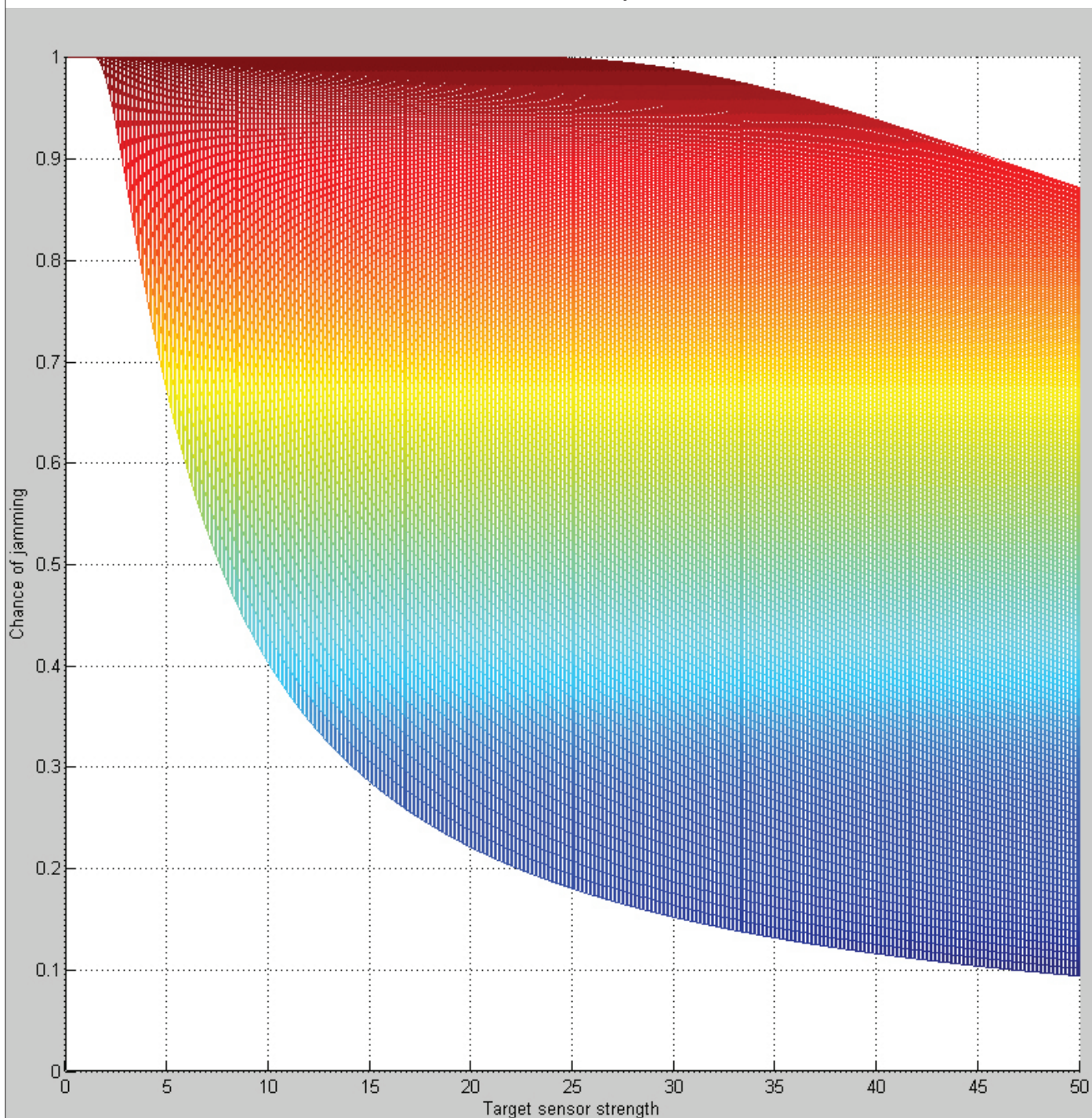
Graphs for examples of having 1-8 same ECM modules are in Appendix A.

Multispectral jammers

If we take a look at the same graph from X-Z side we can see the following distribution. This side shows that if we find a random target with sensor strength anywhere from 1,2 to 50, our jamming success using 4 modules with specified jamming strength will be anywhere between the lowest limit and the highest limit of the colored area. What one wants to do is narrow down the band between both limits so that one is more likely to jam a random encounter.
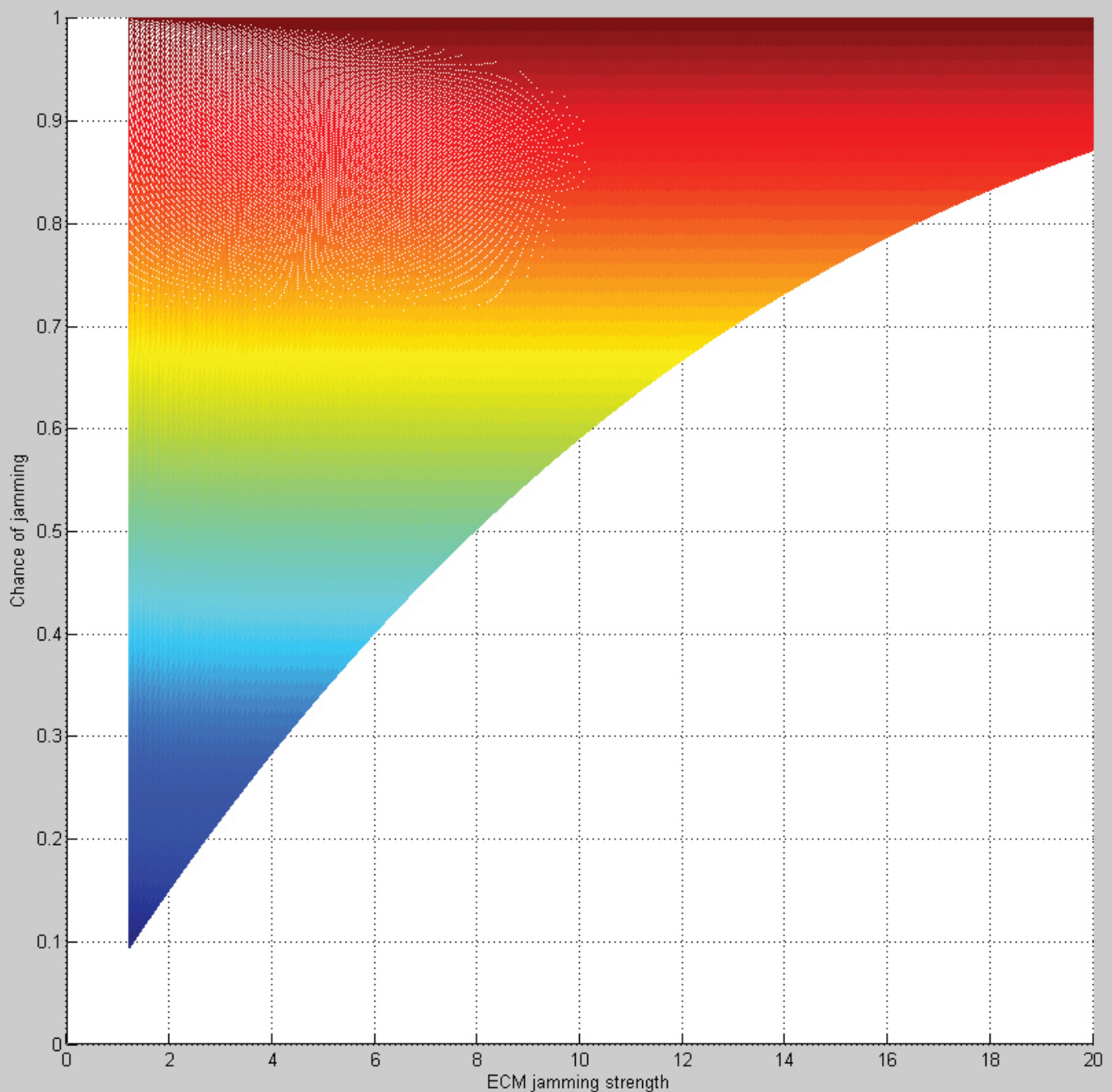
Graphs for encounters vs targets with strengths from 1-50 are in Appendix B.

Now let's try something else. I am going to mix numbers a bit, present you with multiple hostile targets all with sensor strength 24.

No. jammers vs no. targets	str 9,68	str 8,37	Comment:
2 multispecs vs 1 target	0,643988	0,57587	
2 multispecs vs 2 targets	0,162677	0,12162	same as having 1 target with 2 hits
3 multispecs vs 1 target	0,755859	0,70085	
3 multispecs vs 2 targets	0,519483	0,40002	enormous difference
3 multispecs vs 3 targets	0,065613	0,04242	
4 multispecs vs 1 target	0,873256	0,82012	
4 multispecs vs 2 targets	0,742257	0,57517	enormous difference
4 multispecs vs 3 targets	0,104762	0,08463	
4 multispecs vs 4 targets	0,026464	0,01479	
5 multispecs vs 1 target	0,924376	0,88285	
5 multispecs vs 2 targets	0,838977	0,68859	enormous difference
5 multispecs vs 3 targets	0,290231	0,19987	enormous difference
5 multispecs vs 4 targets	0,042254	0,02417	
5 multispecs vs 5 targets	0,010674	0,00516	

The most noticable detail in this table is how different jammings from previous table stack with each other. For example take the 4vs2 example from this table. With maxed skills you have 74% chance of jamming them, but with level 4 you only have 57,5%. The reason for such big difference is that when one tries to jam multiple targets, his probabilities against single targets start multiplying with each other. If one multiplies a lower number with another lower number, the outcome is even lower than the two independent starting numbers. Example: if one had 100% jamming at level 5 of one target and you multiply it with another 100% for the second target, one still has 100% chance of jamming both. If one had 95% chance for 1 jamming and you multiply it with itself, you only get 0,95*0,95=0,9025 = 90%. That's 10% lower than what you could have and this example was only about 2 targets. In real fight you get many more.

RACIAL JAMMERS

One can do similar tables and graphs with racial jammers. But since one can now imagine approximately how jamming works, let us pass the graphs and simply put up some numbers for comparsion.

Say we 2 characters, one has the ability to use racial jammers with strength 13 and one with strength 11. In all honesty that is the difference between level 4 and level 5 characters in all skills. Again, they are trying to jam scorpion(s). This is the comparison:

	Character 1	Character 2
Correct race jamming strength	13	11
Incorrect race jamming strength	4,33	3,56

No. jammers vs no. targets	Character 1			Character 2		
	Correct race	Incorrect race	Mixed	Correct race	Incorrect race	Mixed
1 jammer vs 1 target	0,5417	0,1806	/	0,4583	0,1528	/
2 jammers vs 1 target	0,79	0,3286	0,6245	0,7066	0,2823	0,5373
3 jammers vs 1 target	0,9037	0,45	0,6923	0,841	0,392	0,6112
3 jammers vs 2 targets	0,4279	0,0594	0,0594-0,4279*	0,3238	0,0431	0,0431-0,3238*
4 jammers vs 1 target	0,9559	0,5492	0,5492-0,9559*	0,9139	0,4848	0,4848-0,9139*

*for this particular type of jamming there are so many possible ways of jamming, that it is best to keep the success chance in an interval of percentage

It is difficult to predict anything with more than 4 jammers fitted for more than 1 target because there are so many ways of jamming them and one has to take them all into account. If you wish more details in this regard, check the link to my previous guide, on page 4.

One can and probably asks himself "Why use racial jammers?". Well the answer is plain - if one is asking that kind of question one does not really need racial jammers in his line of jamming - that is in small and fast engagements where one can assign more than one jammer to any target.

If, however, one tries to jam multiple targets by assigning only one jammer per target and can even pick the race of his targets, then one wants to use racial jammers that have longer range and higher chance of one-module-jamming-success of a single target.

Eсм drones

The Red Moon Rising patch in Decembre 2005 brought 7 new types of drones, including among them the ECM drones.

These come in light (EC-300), medium (EC-600) and heavy (EC-900) variations , but no tech II. They are all of caldari hull origins.

Skill requirements:

Drones level V

Electronic Warfare level IV

Electronic Warfare Drone Interfacing level:

    I   (EC-300)

    II (EC-600)

    III (EC-900).

These drones work as ECM - Multispectral modules would without the need of pressing ALT+F1-F8 buttons. When they engage target, they close in on it and

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DRONES (0 OF MAX 5 IN SPACE)

📁 Drones in bay (10)	⤒
Hornet EC-300 (5)	
Vespa EC-600 (5)	
📁 Drones in local space (0	Move drone ▶
	Show Info
	Launch Drones

DRONES (5 OF MAX 5 IN SPACE)

📁 Drones in bay (5)	⤒
Hornet EC-300 (5)	
📁 Drones in local space (5)	⤒
Vespa EC-600 (Idle)	Collapse
Vespa EC-600 (Idle)	Engage Target (5)
Vespa EC-600 (Idle)	Return And Orbit (5)
Vespa EC-600 (Idle)	Return To Drone Bay (5)
Vespa EC-600 (Idle)	Scoop to drone bay (5)
	Abandon Drone (5)

once they reach optimal range, start jamming it. Their jamming cycle lasts for

20 seconds and if a cycle is succesful the target is jammed for the duration.

Each drone has a small amount of jamming strength in all sensor types:

Drone type	EC-300	EC-600	EC-900
Jamming strength	1	1,5	2

The statistics of succesfully jamming a target go as follows:

Our target is again a scorpion class battleship with 24 points od gravimetric sensor strength.

Drone type	No. of drones	Chance of jamming	
EC-300	1	0,04167	Almost a rising linear function
	3	0,1199	
	5	0,1917	
EC-600	1	0,0625	Not so linear any-more.
	3	0,1760	
	5	0,2758	
EC-900	1	0,0833	
	3	0,2297	
	5	0,3528	Yes, 35%.

Small drones have 20% chance of jamming the battleship, medium drones have 28% chance of jamming it, and large drones have 35% success chance. This is a lot, but you may not always have the option of using 5 large ECM drones, and ships that can use large ECM drones, normally use damage dealing drones. The most used ECM drones out there are the light ones and medium ones.

A side note: Let's say one is flying a raven with 75m^3 drone space. One can either use 5 medium drones and 5 small drones or 3x5 small drones. The statistics of jamming an apposing scorpion would be:

41,46% for medium + small drones setup and
47,2% for the 3x small drone wing setup.

Alas the bigger percentage, the better.

Statistics for 5 EC-300 drones jamming 1 target
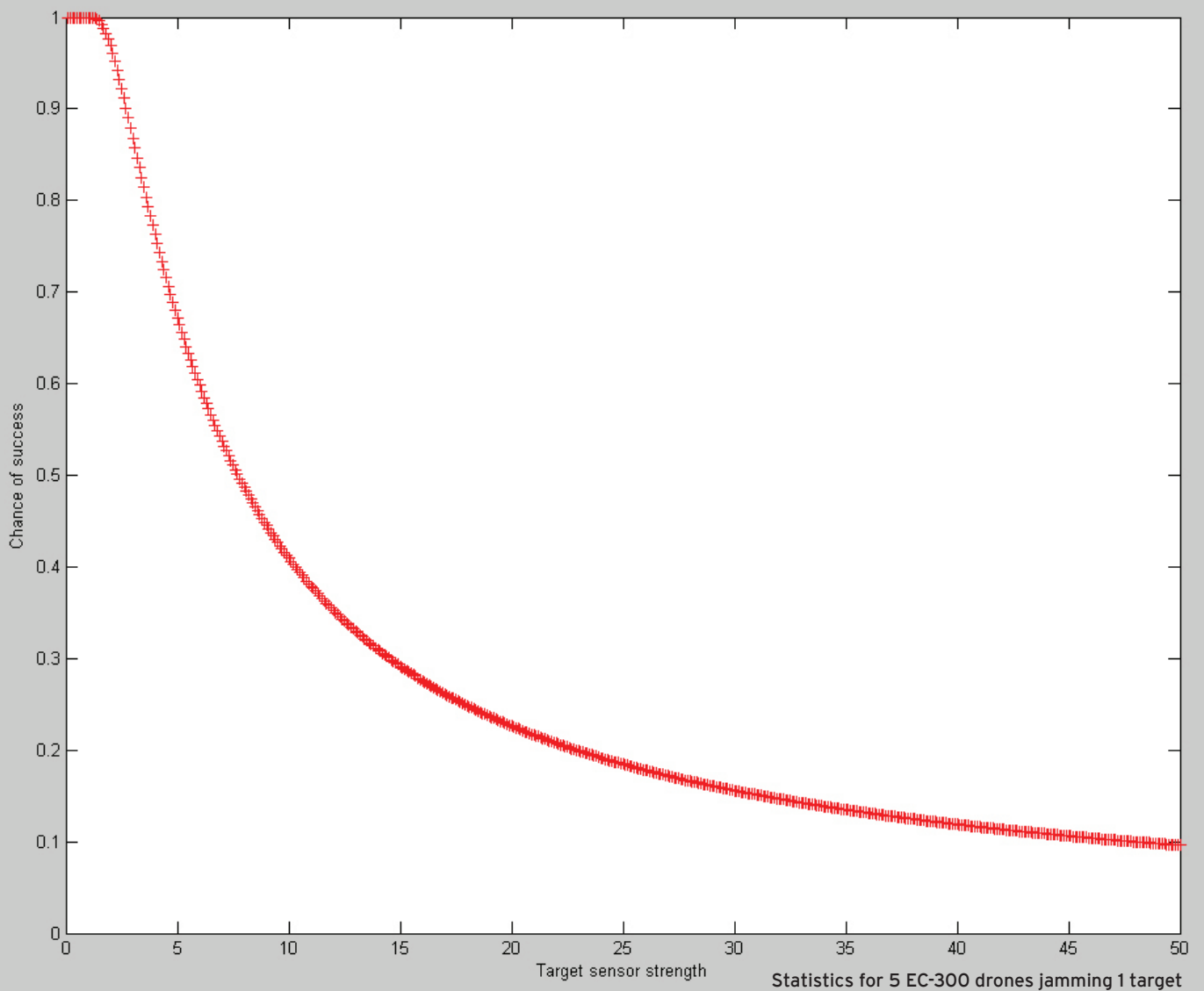
This graph shows the distribution of jamming success of 5 EC-300 drones against 1 target over target's sensor strength (SST). The curve drops from 1 at around 2 SST and reaches 50% at around 7,5 ST. Very useful against frigates and cruisers, multiple wings deadly against even battleships.

Statistics for 5 EC-600 drones jamming 1 target
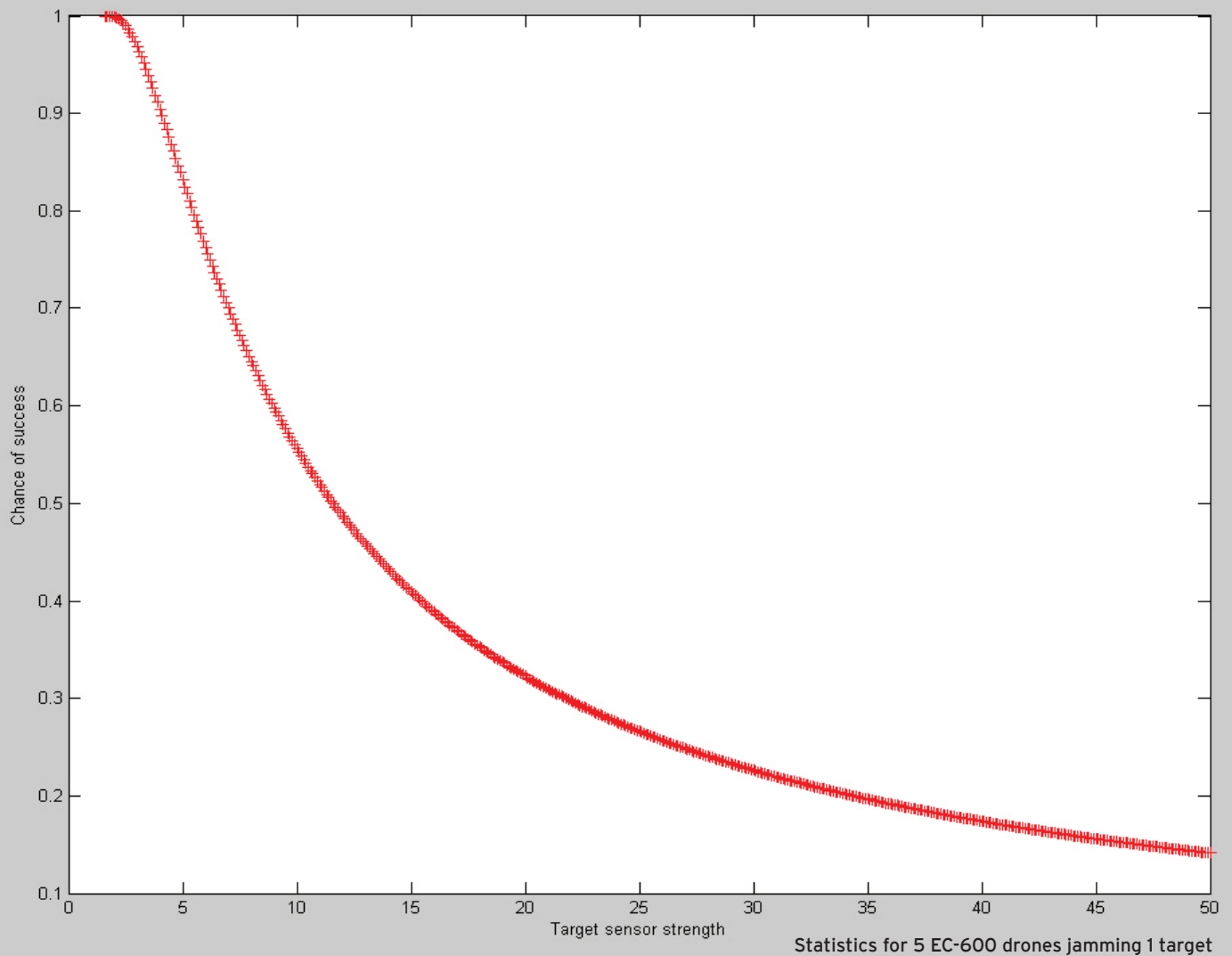
This graph shows the distribution of jamming success of 5 EC-600 drones against 1 target over target's sensor strength (SST). The curve drops from 1 at around 2 SST and reaches 50% at around 12 SST. Very useful against cruisers, battlecruisers and battleships, multiple wings deadly against even force recon criusers.

Statistics for 5 EC-900 drones jamming 1 target
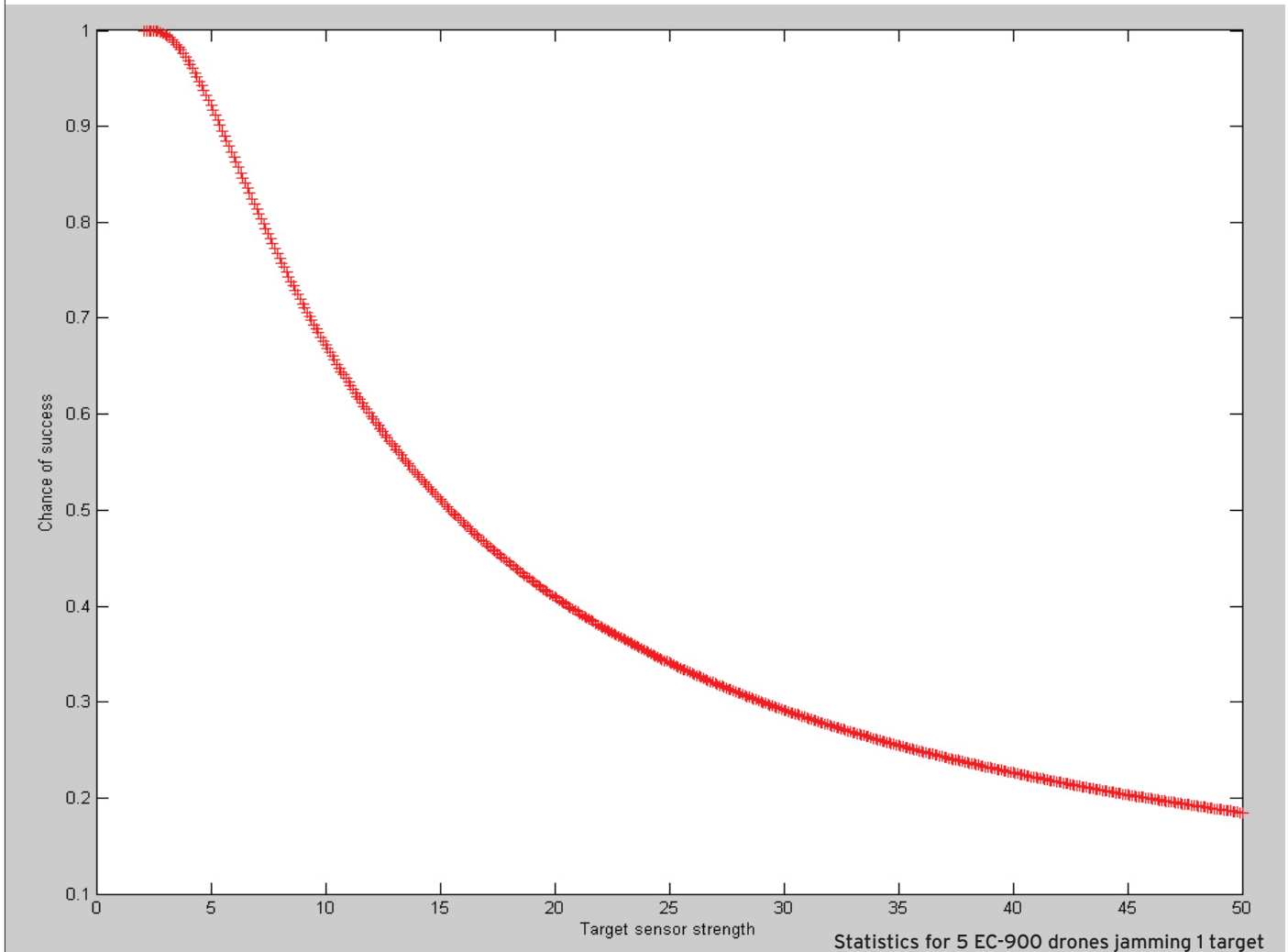
This graph shows the distribution of jamming success of 5 EC-900 drones against 1 target over target's sensor strength (SST). The curve drops from 1 at around 3 SST and reaches 50% at around 16 SST. Very useful against battle-cruisers, command ships and battleships, multiple wings deadly against even force recon criusers. However, it is difficult to mount 5 heavy ECM drones and are usually not used in combat.

ECM TÖTALHELLDEATH

These pages have so far shown a lot of statistics, however they have not really shown how deep the rabbit hole goes. What is the highest amount of jamming strength that one can achieve?

The strongest jamming ship out there is a Black Ops class Widow battleship. With maxed skills it gives a 100% ship bonus. With Signal Dispersion level 5 one can get another 25% bonus to jamming strength. And lastly one can use additional SDA modules and gang bonuses.

Best Multispectral module in the field is the officer type

Estamel's Modified ECM - Multispectral Jammer

that has 3,2 points of base strength (pts). With maxed out skills and flying a Widow with 4 SDAIIs and maxed gang Information Warfare bonus one can achieve the strength of 14,21 pts (17,05 when overheated). A lot.

Best named racial jammer is called

Legion ECM *racial type*

and has base strength 3,7 pts. With maxed skills and same setup they can achieve 16,43 pts and 19,72 pts when overheated.

Both modules however are rare and hard to find or expensive to buy. As this is being typed, the CONCORD news is that only 1 Estamel's ECM is currently on the open market and none Legion ECM modules can be found anywhere at all.

Things are not as bleak as it seems though, the next best thing to Legion modules are tech II ones that have 3,6 pts base strength and can give a pilot up to 19,19 pts. Quite enough to insta (on first try) and perma (with all tries during fight) jamm most battleships.

Just for comparison one might be interested to know what chance one has of jamming an opposing Scorpion class battleship if one has 4 Estamel's modules fitted with 3 SDAIIs and maxed gang information warfare bonus (which is 25,85% bonus to all sensor jamming types).

With such a fitting Widow's Estamel modules have the strength of 13,91 and the ship can launch a wave of EC-600 drones.

The chance of jamming an opposing Scorpion for 1 cycle would be 97,74%.

The chance of jamming it for N cycles is $(97,74\%)^N$.

(for example: jamming it for 10 cycles (200 seconds) would give $(97,74\%)^{10}$ = 80%)

ECM is not omnipotent and it fails at times. This means that no matter how high one's skills are, no matter what ship and what modules, there is always a chance that all jamming modules fail a cycle and that drones are unsuccessful. Meaning that one's ship is being left defenseless for at least 20 seconds. And more often than not, one must understand that those 20 seconds can be and are fatal for the jamming ship. That is the reason why so few people actually use active jamming in combat.

As my professor always said at Republic Military School at Ammold: "Statistics is a bitch, never to be trusted. Always there when you aren't looking, but for the one time that you need her, she's fucking another man". Wise man, he was.

Anyway, what most often fails when a pilot tries to jamm a target is that he is not fast enough in doing it. Meaning that once he succeeds in jamming, he has already received shield and maybe even armor damage and is in addition being targeted by hostile drones. One has to be aware of such situations and ready to either flee or engage in

a taxing combat, switching attention between his primary target, drones, and all additional targets if and when they arrive.

Most jamming pilots will try to jamm you from a distance away, giving you no chance to come closer, and their Caldari originating ships give them all the ability to do so.

If a jamming ship has been attacked by fighters or damage dealing drones from an opposing Dominix class battleship or opposing Moros class dreadnought, one should leave the area immediatelly, since he most likely does not have enough time to kill all opposing drones before new waves of them arrive. As well if one intends to enter highly combat active zones with a jamming ship in a gang or group, one should be aware that his ship is most likely to be the first one to be targeted and destroyed by hostiles forces, since electronic warfare is one of the most feared in the universe and can be quickly dispatched if nonjammed hostile numbers allow to do so.

Since there are so many ways in how ECM can fail, there are of course ways in how to make jamming better, more effective and faster and ways in how to survive those cycles during which ECM modules fail.

If one's ECM cycle fails, he should be aware that the most logical thing for him to do in order to survive would be to wait for another cycle then flee the encounter unless the opposing ship is nearly or about to be destroyed.

One should remember to fit a smartbomb to high slots if possible (battleship/black ops only) for 0.0 space roaming or fit antifrigate offensive weapons (both recon ships). If one is flying the jamming frigates, well the Griffin is dispensable and the Kitsune should be fitted for highest speeds possible.

As well if one wants to have highest damage possible, one should forgo the SDA modules and switch to damage mods, in addition to having damage dealing drones on board.

Keep in mind as well that the pilot doing the jamming is most likely never alone since jamming profession is considered as support combat type only, complementing the firepower abilities of main fleet. Therefore if you yourself choose this profession you should never be without support.

ECCM DEFENSE

ECCM, BACKUP ARRAYS AND PROJECTED ECCM

As you progress through this manual you, reader, are becoming more and more proficient in theoretical textbook jamming. Keep in mind though, that pilots of EVE know the dangers of jamming and act accordingly if they suspect that the hostile fleet is fielding heavy ECM capabilities.

What that means is that EVE arsenal of defensive ship equipment boasts the modules called ECCM, Sensor Backup Arrays and ECCM Projectors. These work similarly to ECM, only that they are boosting the targets sensor strength (either self or actual friendly target).

Item name	Attributes	Range	Slot
ECCM - Racial I/II*	bonus 80% (96% tech II)	self	Med
ECCM - Omni I/II	bonus 80% (96% tech II)	self	Med
Racial Backup Array I/II*	bonus 40% (48% tech II)	self	Low
Multi Sensor Backup Array I/II	bonus 40% (48% tech II)	self	Low
ECCM Projector I/II	bonus 100% (120% tech II)	20/24km	Med
* word "Racial" stands for the different sensor types (gravimetric, magnetometric,radar,ladar), for example: ECCM - Ladar II			

The only difference between Racial and Omni ECCMs is that racial use less cap. ECCM Projectors work for all sensor types so they are Omni modules anyway.

I have not noticed any differences between Racial Backup Arrays and Multi Sensor Backup Arrays, so you can use either racial or Multi Sensor ones (this must be a bug at the moment, it is a bit lame for 2 different modules to exist, both giving same bonus, but for one of them giving bonus to all 4 racial sensor types without any noticable penalty). ECCMs and Backup Arrays give bonus to the pilto who activated it (self).

The ECCM Projectors give bonus to target friendly player inside 20 km (for tech I variant) or 24km (for tech II variant).

ECCM DEFENSE
EXAMPLE

Now let us take a look at a fictional example. A distinctive protagonist in this example is flying a Widow with maxed skills and jumps into a hostile 2-man Megathron squadron of evil pirates. Normally he would have no problem with it, as he would have practically 100% chance of jamming them both.

Thing is now, these two particular Megathron pilots are seemingly prepared for just such occasion as the space surrounding them is sizzling with supportive ECCM energies (they are boosting each other with one ECCM Projector II each).

Each Megathron by itself has 21 magnetometric strength, but now as they are supporting each other, they both have 46.2 strengths. Meaning the poor Widow pilot only has 84% chance of jamming them. This gives him hope as it means that he has high chance of jamming them for at least 1 cycle and getting out of confrontation with Gallente dogs of war. So he tries.

EPILOGUE

In my previous guide I was trying to be a bit smart at the end of it, trying to

make a rule for fittings to any and each situation.

So let us forgo that kind of thoughts and leave them to ourselves.

I only wish you best of luck in the world that has been called EVE and hope that

the whore-godess that   the jamming statistics is shows mercy on

you and absolutely   none to your enemies. However I wish

the same to   myself, so it is probable that our

jam-   ming chance should work

the same for both of us

should we meet :)

*DE AD gang about to jump systems.
Answer to get reward: how many jamming
ships were we using in this gang?
EVEmails to Virgo I'Platonicus*

(Answer: all of them)

SUCCESS DISTRIBUTION CHANGE BETWEEN 1-8 JAMMERS
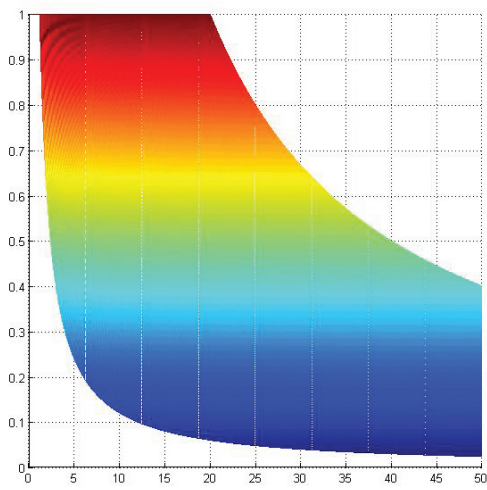
1 jammer vs 1 target of SST between 1.2 and 50
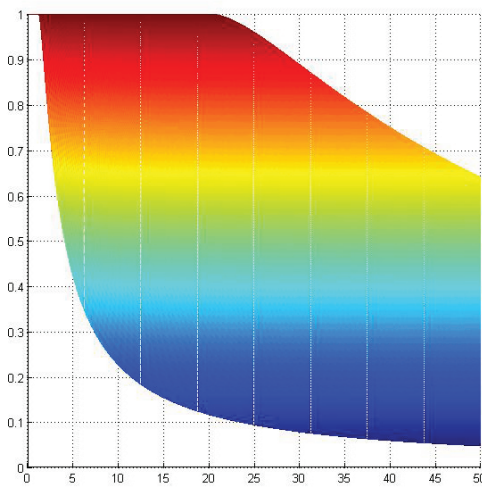
2 jammers vs 1 target of SST between 1.2 and 50
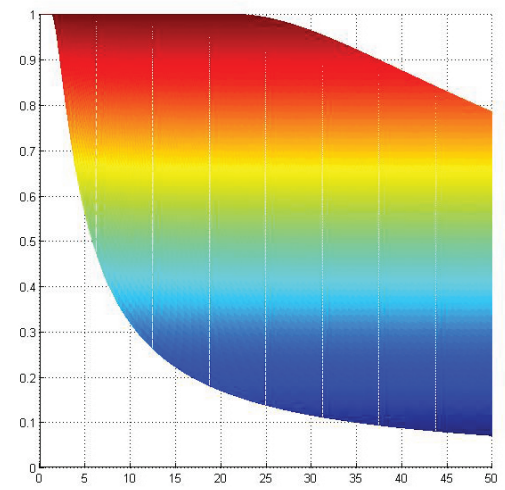
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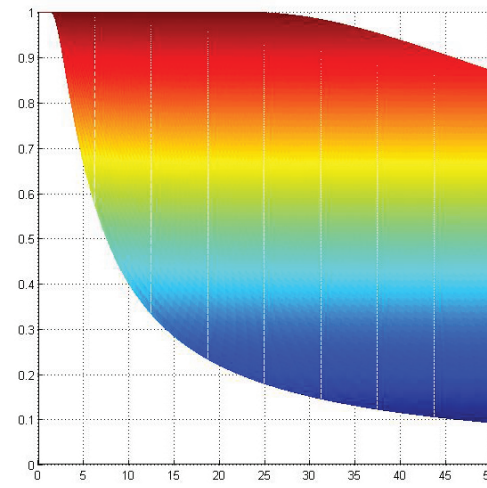
4 jammers vs 1 target of SST between 1.2 and 50
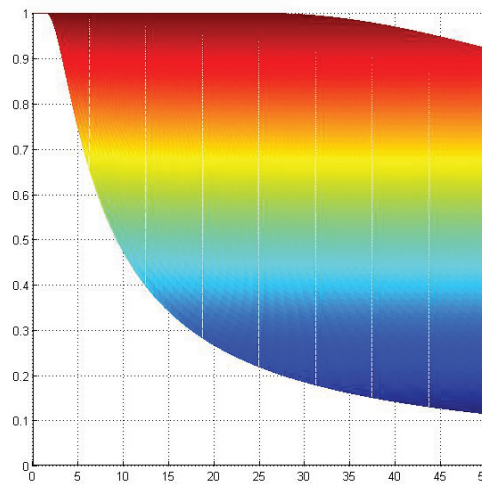
5 jammers vs 1 target of SST between 1.2 and 50
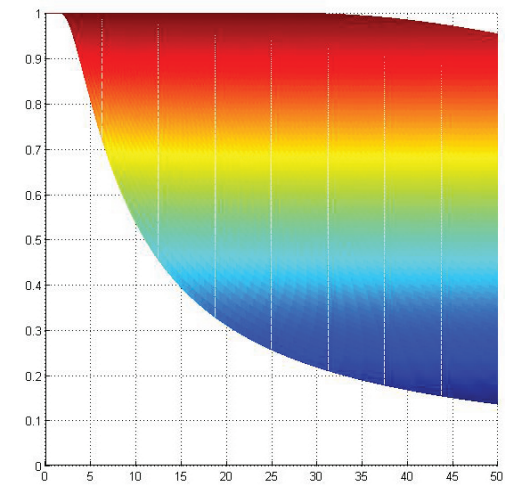
6 jammers vs 1 target of SST between 1.2 and 50
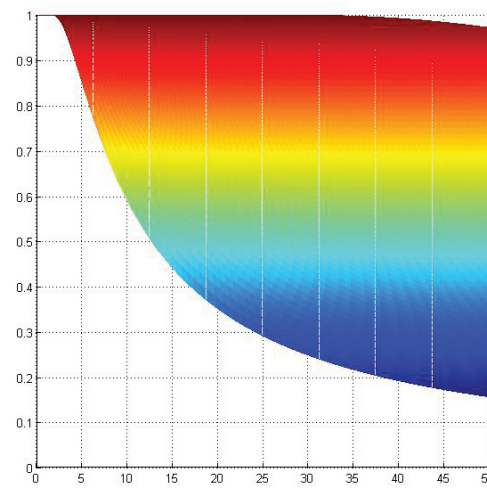
7 jammers vs 1 target of SST between 1.2 and 50
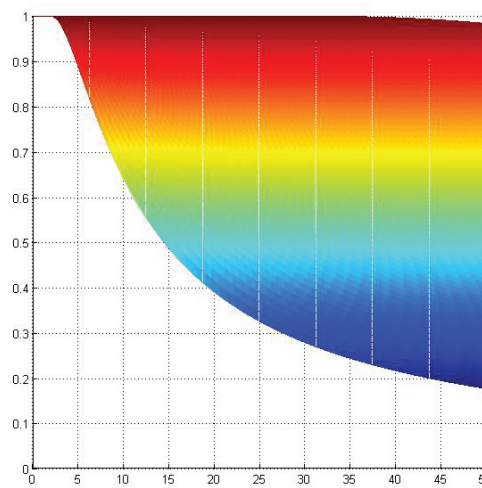
8 jammers vs 1 target of SST between 1.2 and 50

APPENDIX B

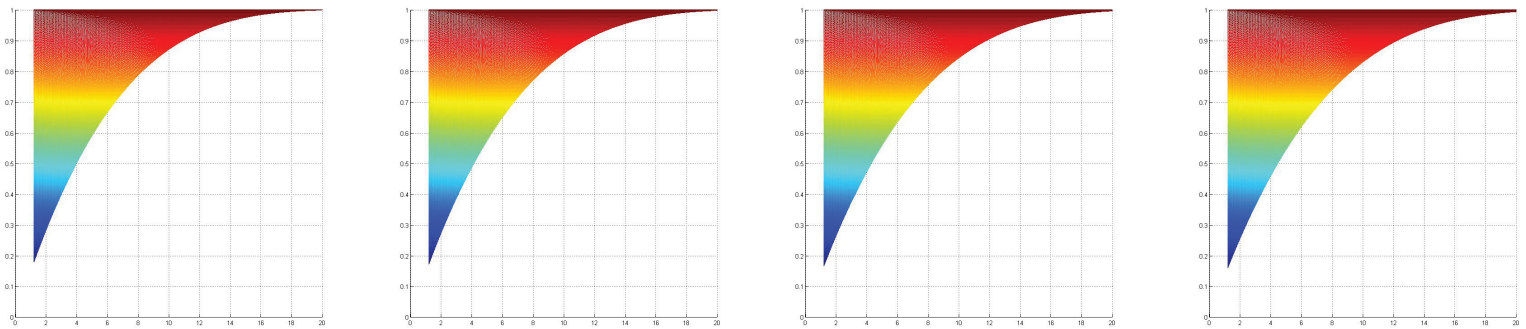## SUCCESS DISTRIBUTION FOR 4 JAMMERS VS TARGET SST BETWEEN 1,2 AND 20
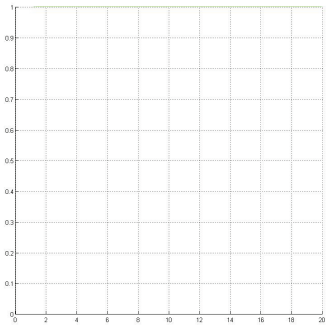
SST 1
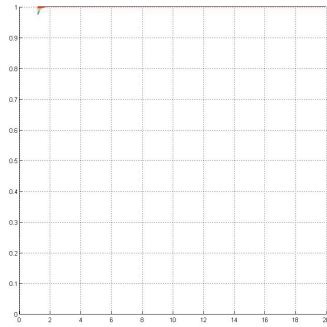
SST 2
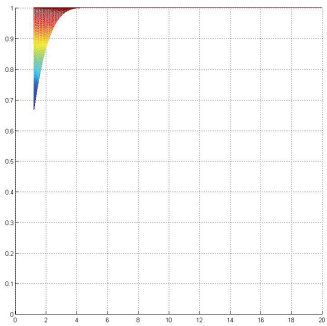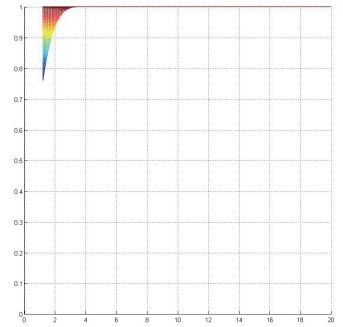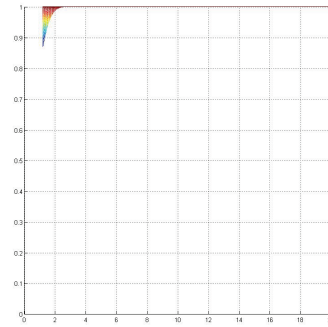
SST 5
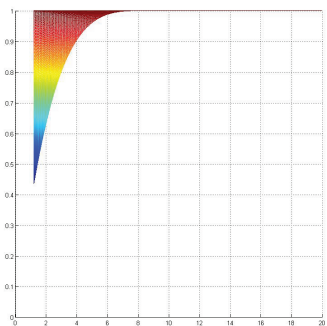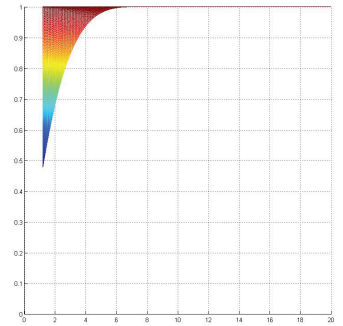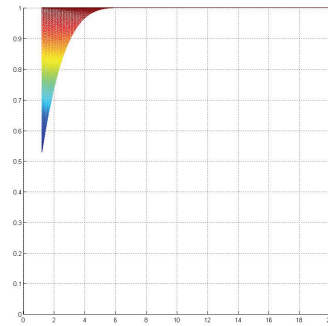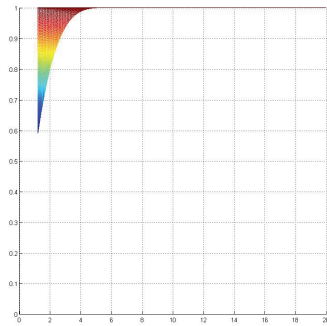
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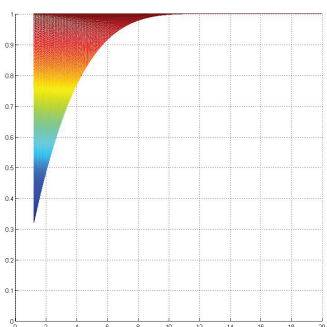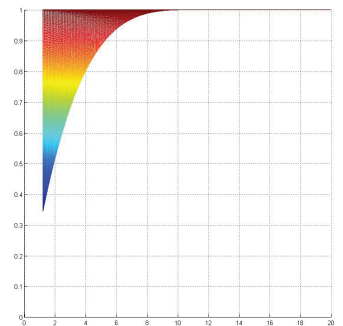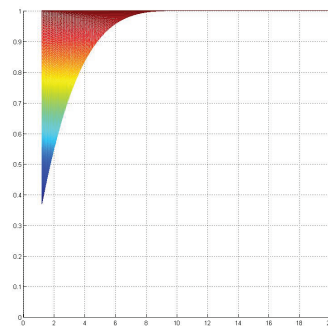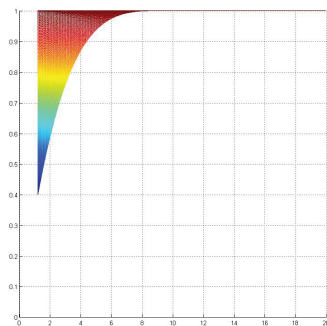
SST 13
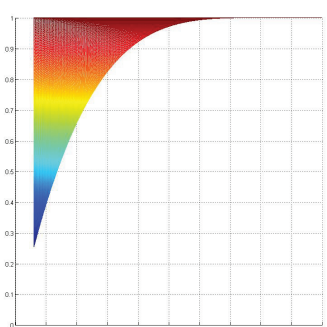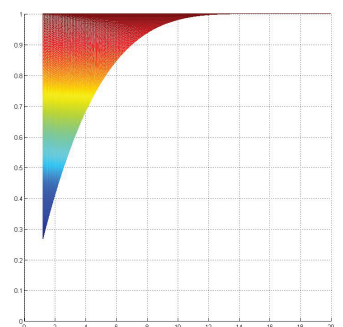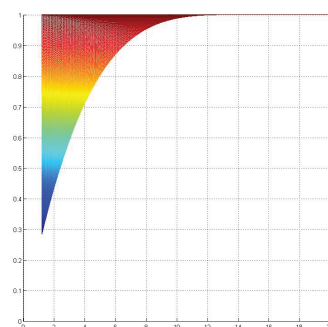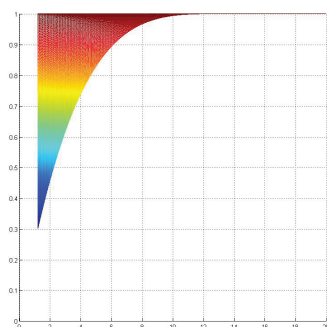
SST 17

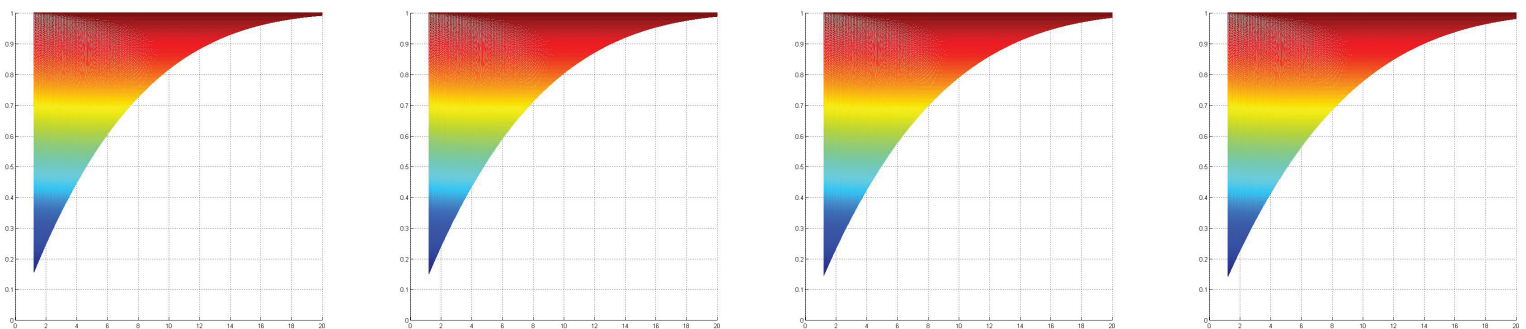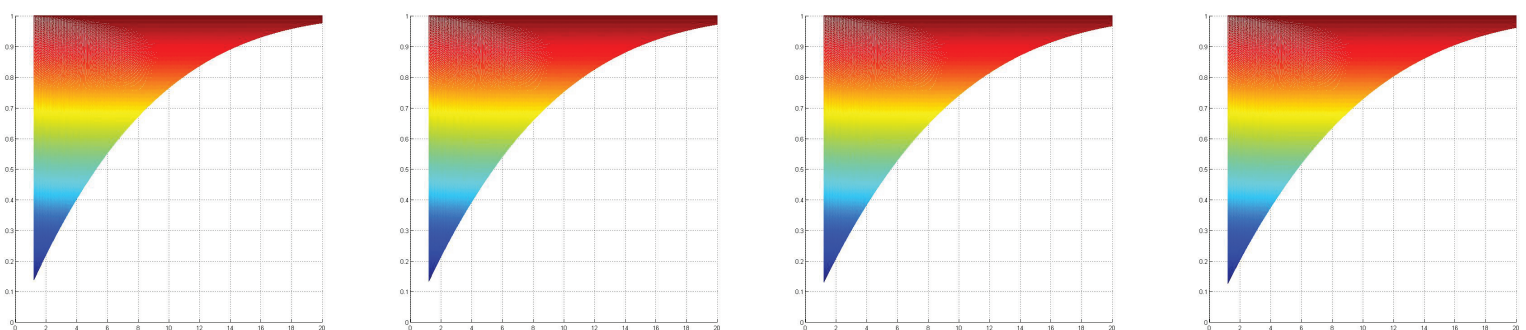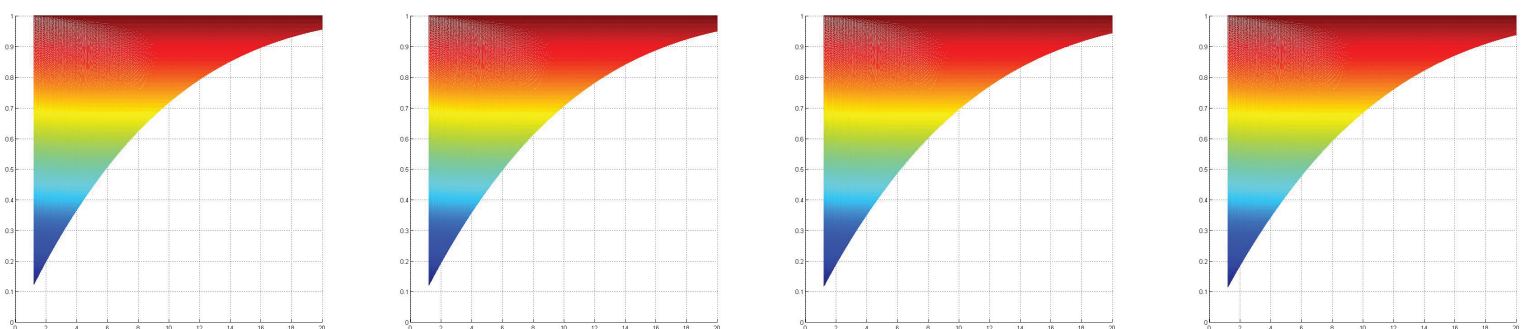## SUCCESS DISTRIBUTION FOR 4 JAMMERS VS TARGET SST BETWEEN 21 AND 50
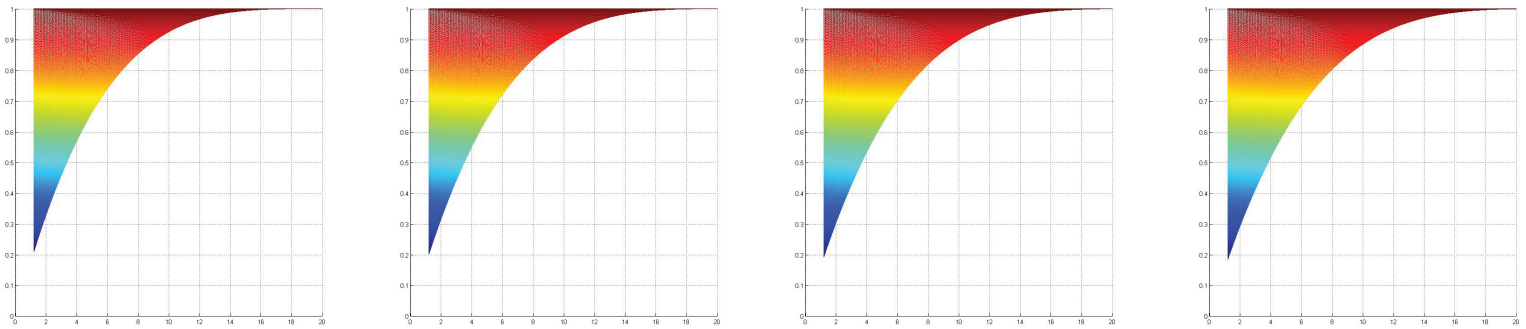
SST 21

SST 25

SST 29

SST 33

SST 37

Success distribution for 4 jammers vs target SST between 41 and 50

SST 41

SST 45

SST 49